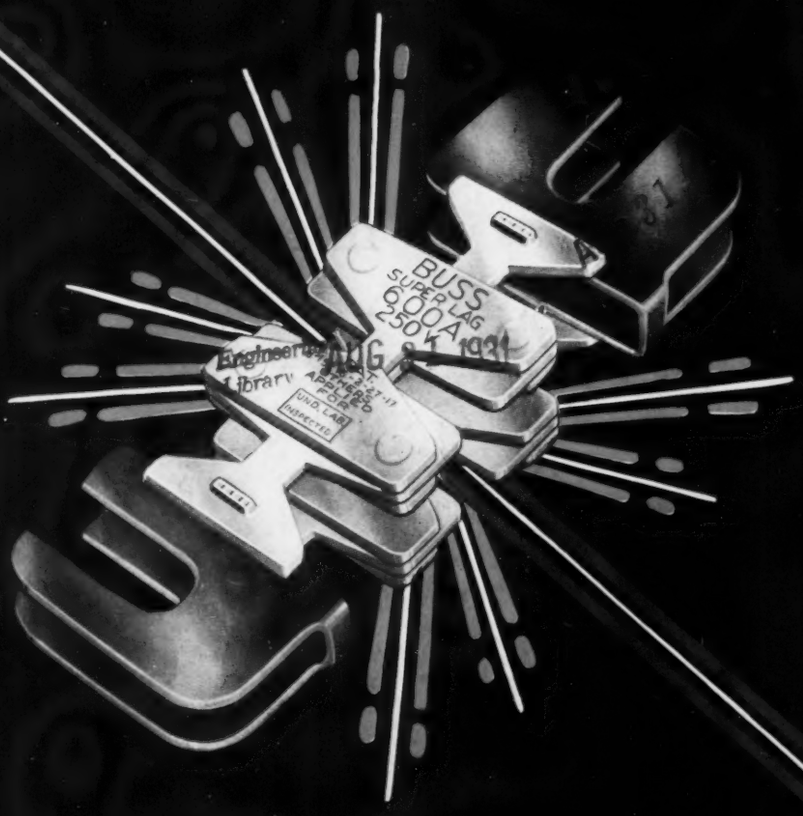
ELECTRICAL WORLD



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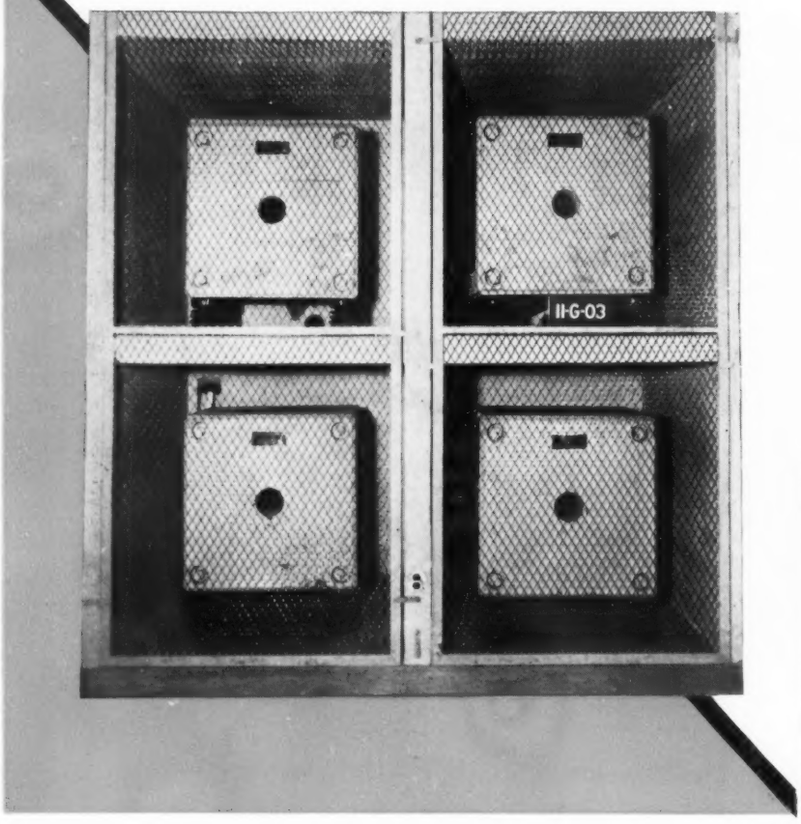

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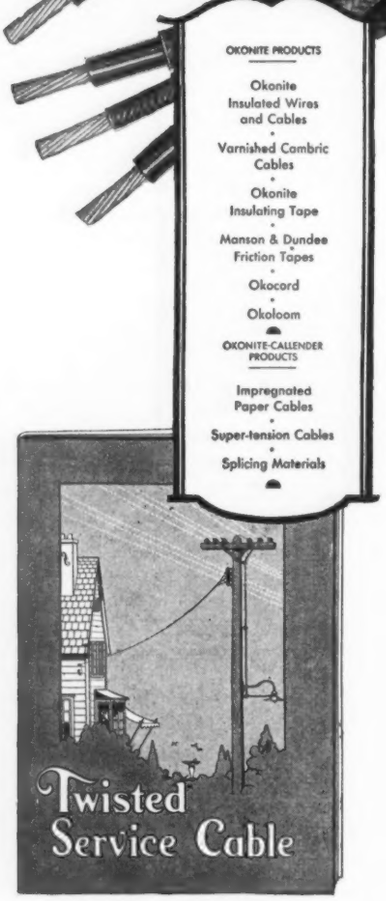

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ELECTRICAL WORLD

for the Week Ending

August 29, 1931

The foundation of the relief of distress arising out of unemployment must be complete, effective and energetic local voluntary organization co-ordinating with local authorities. I appeal to the business and welfare agencies to see to the creation of such definite organizations to meet the situation where such do not already exist.

W. S. GIFFORD

Director U. S. Unemployment Relief. President American Telephone & Telegraph Co.

A major desertion from N.E.L.A.

Philadelphia and New Jersey properties—Philadelphia Electric, United Gas Improvement and Public Service Electric & Gas companies—quit national association and ask employees to give up committee work—*p. 354.*

—**Missouri commission orders** Cities Service to file schedule of rates for gas service whether through distributing companies or direct to the consumers as initial step in the Doherty-Missouri dispute—*p. 358.*

Commissioner urges federal control

Federal regulation necessary, asserts Marcel Garsaud of the Federal Power Commission in an argument for the extension of control upon a regional plan. Utilities seen as benefiting to a major degree—*p. 368.*

—**Radio interference problems** viewed as a co-operative task by California engineers, who see radio trade associations as the logical arbiters and neutral parties in such discussions and remedial work—*p. 384.*

Canadian city closest to all-electric goal

—**Winnipeg, the electric city,** has a domestic-customer energy use of 4,000 kw.-hr. a year. Customer receptivity, low rates, small fuel competition and contractor-dealer co-operation are behind the results—*p. 364.*

—**Value of wood-line insulation** proved to satisfaction of Carolina Power & Light Company engineer, who offers a discussion of the important factors to be considered if advantages are to be fully realized upon—*p. 376.*

Cove Creek may split Muscle Shoals board

—**Italy electrifies its railroads** at a rapid rate. Activity centers in north, where water power abounds and energy is available at an attractive price for pushing established programs—*p. 382.*

—**Tests of breaker insulation** by power-factor methods advocated by head of New England engineering firm. Results interesting, but manufacturers' representatives demur—*p. 374.*

New Jersey Public Service, U. G. I. and Philadelphia Electric Quit N.E.L.A.

EIGHT or nine weeks after the event, it became generally known late last week through belated newspaper reports that very soon after the adjournment of the annual convention of the National Electric Light Association at Atlantic City on June 12 three important Eastern utility companies resigned their membership in and withdrew their support from the association. These were the Public Service Electric & Gas Company of Newark, N. J.; the United Gas Improvement Company of Philadelphia, and the Philadelphia Electric Company. The three organizations are closely connected, the Philadelphia Electric being now the chief electric subsidiary of the United Gas Improvement, a holding corporation, and the New Jersey utility being allied with both the others through stock holdings and physical interconnection. All three are units in the group of so-called Morgan companies. Their defection from the N.E.L.A. involved not only their withdrawal as corporations but notification to all employees concerned to withdraw as individuals and resign any committee memberships they might have.

The source of the press stories was not revealed, but confirmation of the resignations was given both by men competent to speak for the three companies and by Paul S. Clapp, managing director of the N.E.L.A. No reason, Mr. Clapp asserted, was contained in the formal resignations to explain why they were tendered, and in the absence of John E. Zimmermann, president of the U. G. I., who is in Europe, and the reticence of Thomas N. McCarter, president of the Public Service Corporation of New Jersey and its subsidiaries, no official of either of these companies or of the Philadelphia Electric would consent to take responsibility for any word of explanation.

The New York *Times*, however, quotes an unnamed official to the effect that the source of dissatisfaction lay in the make-up of the vice-presidential ticket for 1931-32. As all members of the association know, it is customary for the vice-presidents to succeed to the presidency in the order of their election, and hence in the annual selection of a new man to tail the list a coveted post is filled. The hold-over vice-presidents were headed by M. E. Sampsell of Chicago, an Insull company man, and when another Insull official, Harry Reid of New York, was selected as the new official, thus giving the Insull organization two of the four vice-presidents, it is inferred that friction arose.

Whether, as some of the newspapers had it, this displeasure with the make-up of the ticket, somewhat trivial in itself, is indicative of a split between large holding-company groups on more important questions of policy—such, for instance, as the proper way in which to meet both honest political attacks and the misstatements of demagogues—must remain for the future to develop. Such a rift can be prophesied only on the very uncertain assumption that the N. E. L. A. headquarters management shall have the misfortune to fail in the efforts it is sure to make to bring back the disaffected members through some plan honorable and satisfactory alike to them, to the great majority of utility groups still standing firmly by the national body and to that association itself.

▼

Cove Creek Dam Proves a Source of Discord

GOVERNOR HORTON of Tennessee has appointed R. L. Moore of Jellico, an east Tennessee business man, to suc-

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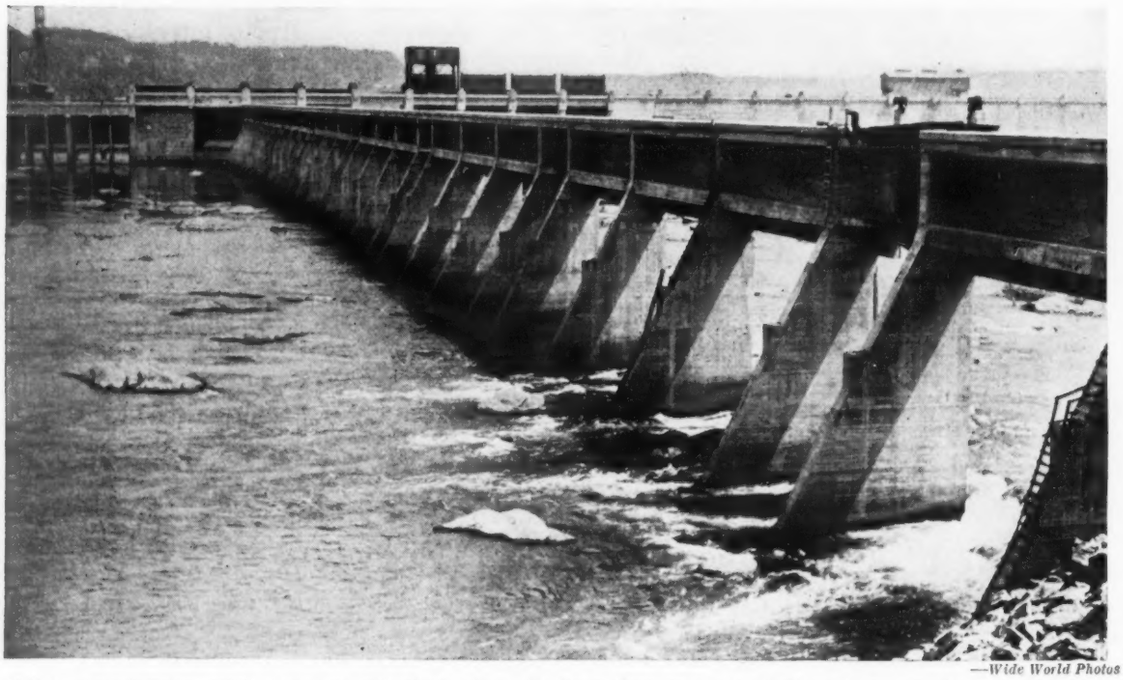
SAFE HARBOR HYDRO-ELECTRIC PLANT APPROACHES STAGE OF USE



—*Wide World Photos*

With construction well ahead of schedule, the mile-long dam at Safe Harbor, Pa., on the Susquehanna River, which will serve the Pennsylvania Water & Power and Consolidated Gas, Electric Light & Power companies, utilizing new 220-kv. lines to Baltimore, is expected to deliver power this year. The initial rating will be 255,000 hp., the ultimate 500,000 hp.

ceed W. A. Caldwell (resigned) as a member of the Muscle Shoals Commission. Mr. Moore comes from the county where the Cove Creek dam would be built and is said to have announced that his principal interest is in that project, which is seen as a means of bringing cheap power to the Knoxville and Chattanooga districts. Cove Creek is apparently likely to prove a stumbling block to the new commission in its endeavors to find a solution of the Muscle Shoals problem on which the members can unite and which can be recommended as primarily in the interest of agriculture.

At a hearing in Knoxville divergent views were expressed as to the operation of the Shoals plant. J. W. Taylor and O. B. Lovette, east Tennessee congressmen, said they would oppose a Muscle Shoals bill which does not include construction of the Cove Creek dam. They advocated legislation that would enable the plant to furnish farmers with cheap fertilizer, preserve power generated for the benefit of all the people and lease "anything left" to the power interests. Mercer Reynolds, a member of the commission from Tennessee, expressed the view that Muscle Shoals must be disposed of before the Cove Creek dam is built.

At a meeting of a subcommittee of the commission in Birmingham a proposal that the State of Alabama take over and operate the power plant was made by Arlie Barber, former city commissioner of Birmingham.

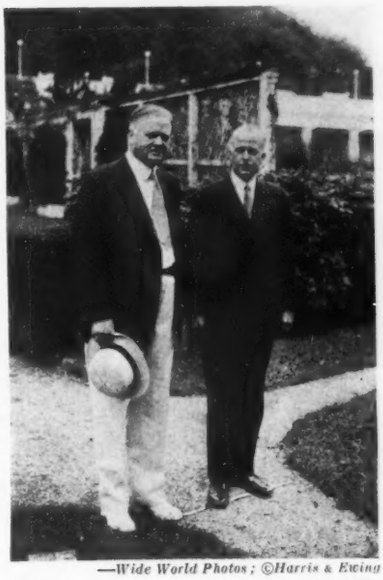
▼

Television Engineers Paint Rosy Picture

ENGINEERS ASSOCIATED with the television broadcasting station of the Columbia chain say, according to spokesmen for that radio system, that there is no question that interest in television is growing rapidly and that sets are being installed in homes at an increasing rate. They hold that it is not at all farfetched to believe a million sets will be in active use before the end of 1933 with a power consumption value of about $11,000,000 annually.

According to the roseate calculation, it is distinctly within the range of possibility that there will be more than eleven million television receivers in domestic use by 1942. Power consumption represented by this number of sets might, it is asserted, represent a value to power companies of more than $120,000,000 a year. It is estimated that there are now about 30,000 sets in use throughout the country, and the television promoters think it entirely possible that sets will be installed at a rate approximating that of sound radio sets over the past ten years.

TAKES UP MOMENTOUS TASK



—Wide World Photos; ©Harris & Ewing

Walter S. Gifford, president A.T. & T., with President Hoover after his appointment to head national council on unemployment.

▼

Georgia Defeats Bills Increasing Utility Taxes

WITH THE ADJOURNMENT of the Georgia Legislature last Saturday the last regular legislative session in any state in 1931 came to an end. None of the bills designed to increase taxation on public utilities was passed at Atlanta, and no other important bill aimed at utility companies became law.

In the last hours of the session a member of the House proposed an investigation of the Public Service Commission designed to bring out on what it bases prescribed rates, what control it exercises over holding and management companies, what services it renders customers, what it does to extend rural service, how valuations are fixed, its general methods and procedure in regulation, and the duties of its employees.

▼

Idaho's Tax May Not Apply to Interstate Power

BY A DECISION of three federal judges, sitting in statutory court at Boise, Idaho, the kilowatt-hour tax enacted this year by the Idaho Legislature has been held constitutional in so far as the intrastate questions raised were concerned. The court held, however, regarding interstate transmission, that it desired further information on the point whether or not the entire operation of generation, transmission and distribution of electric power is in interstate commerce. That part of the question is therefore left open for further evidence. The decision was rendered on August 20.

▼

San Antonio Company Abandons Merchandising

SALE OF APPLIANCES for use with gas and electricity and of equipment for household use will be discontinued by the San Antonio Public Service Company on September 1, according to W. B. Tuttle, president of the Texas company.

As previously reported (ELECTRICAL WORLD, July 18, page 93), Attorney-General James V. Allred of Texas recently filed suit for forfeiture of the charter of the company, alleging that it was exceeding the powers granted it by its charter in conducting a merchandising business. President Tuttle is quoted, however, as saying that the pending suit is not the reason for abandoning the business. It is the general practice of public utility companies, both gas and electric, in Texas to operate a merchandising business as an adjunct to their main purposes.

▼

Cities in Many States Dally with Ownership

AGITATION CONCERNING existing or proposed municipal power plants continues active in many districts of the country—more especially the Middle West.

Defeat of the plan to bond Marietta, Ohio, to establish such a plant was recorded last week (page 312). Piqua, in the same state, plans an election in November on a bond issue to finance a municipal light and power plant estimated to cost $810,000. Franklin, Ohio, has temporarily at least abandoned plans for a complete city plant.

In Kentucky Harlan has abandoned a similar project, but Mount Sterling is having plans prepared. It is announced also that the Richmond (Ky.) Water & Light Company's plant is to be transferred to that city for $325,000.

Following the passage of a resolution declaring the present electric rates charged in Sedalia, Mo., by the City Light & Traction Company, an H. L. Doherty utility, to be unsatisfactory, the City Council has empowered the Mayor to appoint a committee of citizens and officials to study the feasibility of a municipal light and power plant.

In Indiana Crown Point contemplates taking bids at an early date for a Diesel-engine street-lighting plant. A petition from North Manchester, Ind.,

for permission to buy the private plant serving it will be heard by the Public Service Commission on October 19. Hartford, Ill., contemplates the erection of a municipal power plant, and it is probable an election will be held on a bond issue. Le Mars, Iowa, will vote September 3 on a proposal that the city establish a municipal plant and distribution system to be financed through future earnings, the preliminary estimated cost being $325,000. Similar movements have been started in other Iowa towns.

In the South, Augusta, Ga., is having plans prepared for a new power and light plant to cost approximately $1,000,000. Pryor, Okla., contemplates an election on a bond issue of $100,000 to finance a power plant and waterworks improvements. Crystal City, Tex., has called for bids for construction of a municipal plant with the view of ascertaining the cost before submitting a bond issue to the voters.

A bid of $500,000 has been made by the Virginia Public Service Corporation for the municipal electric light plant of Farmville, Va., and a special election will be held on September 15 to decide upon its acceptance or rejection.

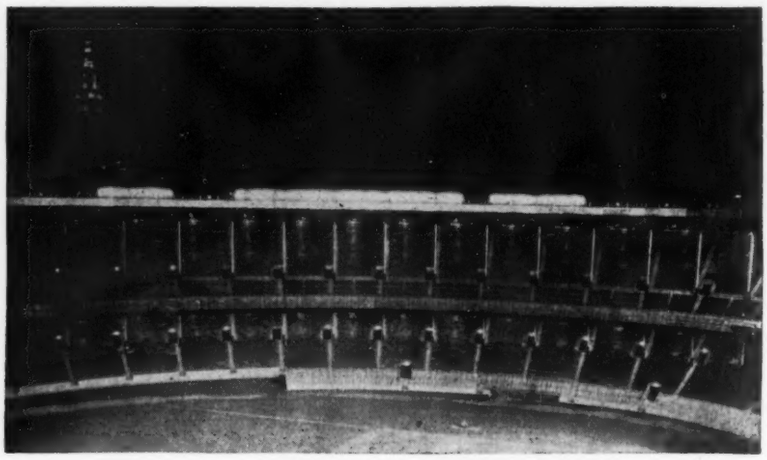
▼

Eagle Pass Plant May See Unit Finished in December

COMPLETION OF THE first unit of the Rio Grande irrigation-hydro-electric project, which, as before told, has for its purpose the irrigation of 70,000 acres of land and generating of 12,000 hp. of electricity, will be accomplished about December 1. The canal and water distributing system are being built by the Maverick County Water Control and Improvement District No. 1, comprising the land owners whose holdings are embraced in the project and who voted $6,600,000 in bonds for this work. The intake of the main canal is 35 miles above Eagle Pass. The initial flow will be obtained by constructing a wingtail of reinforced concrete into the center of the current of the international boundary stream. This diverted flow continues through the canal by gravity, being gradually raised above the level of the river until it reaches the crest of an 80-ft. hill, 28 miles above the intake. It is at that point that the hydro-electric plant is being constructed by the Central Power & Light Company, an Insull property, at a cost of $1,500,000.

The intake will divert from the Rio Grande 1,500 sec.-ft. of water. To the power plant there will be delivered 1,250 sec.-ft. and the remainder will be used for irrigation. Work on the lower project will not be started until after the completion of the upper section.

CLEVELAND STADIUM HAS CONNECTED LOAD OF 590 KW.



Two hundred and fifty General Electric floodlighting projectors, each equipped with a 1,000-watt "Mazda" lamp, light the infield of Cleveland's new Municipal Stadium to an intensity of 50 foot-candles and provide an average of 20 foot-candles throughout the active playing area in the outfield. The stadium has 78,189 permanent seats and cost $3,000,000.

▼ ▼ ▼

Electrochemists Will Meet at Salt Lake City Next Week

ELECTROMETALLURGY AS APPLIED to silver will be an important topic at the Salt Lake City convention of the Electrochemical Society to be held on September 2 to 5. Another session will be devoted to cyanides in metallurgy. "Flotation," the process by which valuable metals in any ore can be readily and cheaply segregated, will form the subject of a symposium.

On Thursday Prof. Jean Billiter of the University of Vienna, Austria, will describe his new electrical apparatus for the purification of drinking water. Dr. M. Sem of Oslo, Norway, will present data on the new Soderberg electrode, which is from 4 ft. to 5 ft. in diameter and has been used with success in the production of carbide. W. E. Moore will report on the latest developments in electric furnace design.

The highly cherished Edward Goodrich Acheson medal will be presented to Dr. Edward Fitch Northrup of Princeton, N. J., who will speak on "What Is Electricity?"

▼

British Grid Scheme Enters Final Stage

ADOPTION OF THE "South Scotland Electricity Scheme, 1931," prepared by the British Electricity Commission, has just been announced by the British Central Electricity Board. Contracts will be put in hand and the work begun at the earliest possible moment. The total expenditure is estimated at $17,341,170. This is the ninth of the ten schemes designed under the electricity supply act, 1926, to cover all Britain.

"Only northern Scotland now remains to be surveyed," declared an official of the Central Electricity Board in an interview. "This is a very sparsely populated area, and although it has some important water-power developments, these have already been linked up with the central Scotland scheme. So to all intents and purposes the business of mapping out the whole of Great Britain for the supply of electric power is complete."

The population to be served by the new undertaking is approximately 255,954, representing the low average density of about 59 persons per square mile. The electricity supply derived from the great water-power resources in Galloway, however, will be utilized by the board in the neighboring areas.

▼

New Way of Charging for Off-Peak Water Heating

OFF-PEAK WATER-HEATING service on a meter rate of 8 mills per kilowatt-hour was made available to its customers on August 7 by the Puget Sound Power & Light Company, Seattle. The new rate is unique in that it offers service for a maximum of eighteen hours per day with a six-hour off period controlled by a time switch set to open the water-heater circuit during the daily system peak of two hours in the morning and

four hours in the evening. A self-starting synchronous-clock time switch is installed on each water-heater circuit outside the cabinet box and remains the property of the company just like the meter.

Heaters used on this rate are of the storage-type thermostatically controlled. Each separate heating installation may be limited to 5-kw. capacity at the company's option, and heater capacity may not exceed 60 watts per gallon of storage tank capacity. Where installations require more than 1,000 watts of heating capacity two units are installed on the tank—one to heat the upper half of the tank, the other to heat the entire tank—both automatically controlled, to give adequate service at times of abnormal use of hot water and to assist in quick recovery. Tank and heater insulation is required in the rate to give adequate and economical service to the customer.

▼

Western Canada Plants Draw American Capital

BUSINESS CIRCLES in western Canada are just now discussing the increasing volume of capital investments being made on the prairies by United States corporations. The latest venture is the offer of $1,398,000 made to the Manitoba government by the Canadian National Light & Power Company, a holding organization formed in Canada by the Iowa Southern Utilities Corporation, for the recently acquired Brandon plant. This group of capitalists in 1925 purchased the Moose Jaw Light & Power plant for $2,875,000. At that time the National Light & Power Company was organized as a domestic corporation by the Iowa parent organization. The Manitoba government has accepted the offer, subject to confirmation by the voters of Brandon.

Since then this company has purchased several smaller plants in different parts of the prairies and in its quest for new plants has been in direct competition with the Insull interests. It was the latter organization that lately bought a block of stock in the Winnipeg Electric Company and had two of its group elected to places on the directorate.

While Winnipeg financiers are reported to think the offer for the Brandon plant is further evidence of the confidence United States investors have in western Canada, even in these abnormal times, they are said to be somewhat puzzled by the proposal, since the Manitoba government purchased the plant only last year from the Canada Gas & Electric Company, which is a subsidiary of the United Light & Power Company, which, though in no way related to the Iowa Southern Utilities, has operating subsidiaries in that state. At that time the government paid for the Brandon plant $1,200,000. Thus the profit in the transaction is $198,000. One of the provisions of the transaction will be an agreement by the new owners to purchase over a period of thirty years a block of energy from the provincial hydro system.

▼

Commission Forbids Payment to Holding Company

AN UNUSUAL order to be issued by a public service commission was made by the District of Columbia regulatory body very recently when it forbade the Washington Gas Light Company to make further payments from its funds to the Central Public Service Corporation, a Chicago holding company, which is said to own 84 per cent of the Washington utility's stock.

The restraining order was issued after the commission had been informed that the gas company had made payments to Central Public Service for gas received without deducting $26,020 which had accrued to its credit as a result of alleged failure on the part of the controlling company to supply it with natural gas.

Defending the legitimacy and propriety of the payment in dispute and charging that the commission's order was illegal, President A. E. Peirce and other officials of the Central Public Service Corporation and their legal counsel argued strenuously to have the order rescinded, but without success. There will, however, be further hearings

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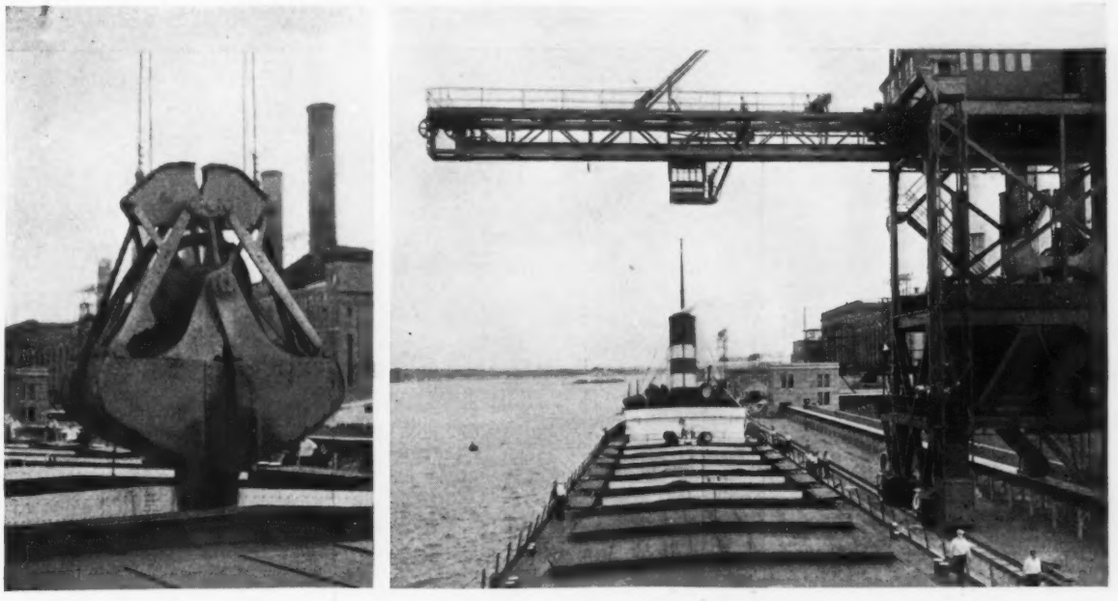
TRAVELING TOWER SPEEDS HANDLING OF COAL AT HUNTLEY STATION, BUFFALO



Unloading 500 tons of coal an hour from lake boats has been made possible by electrical automatic equipment recently installed at Huntley. A 114-ft. traveling tower with a cruising range of 750 ft. was built on the dock. It is equipped with a bucket that picks up 6 tons of coal at one grab and is operated by one man. The first boatload of coal, comprising 10,000 tons, was unloaded in less than 20 hours.

on September 14 and 21 affecting the operating and holding utility companies concerned.

▼

Missouri Commission on Intrastate Service

ORDERING THE Cities Service Gas Company, which transports natural gas from Texas, Oklahoma and Kansas for sale to distributing companies and to consumers in Missouri, to file schedules of rates for the service, whether rendered directly or through the distributing companies, the Missouri Public Service Commission recently said:

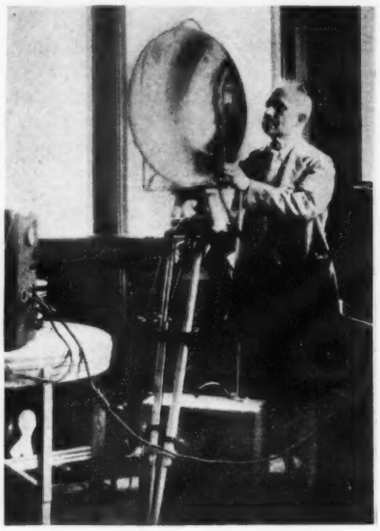
The law is clear that if the utility service is rendered directly to the consumer by the importer, the importer is engaged in intrastate business, or at least in interstate business of such a local character that it is subject to local regulation. The gas-pipe line or electric transmission line owner cannot escape local regulation through ingenious devices whereby he seeks to use the shield of the interstate commerce clause of the Constitution against the exercise of the state police power and at the same time enjoy in substance the rights and privileges of engaging in the local distribution of gas or electricity.

If a utility importing its gas or electric energy distributes such gas or electricity through an agent, particularly one which it owns and controls, it distributes directly to the consumer itself. We are of the opinion that the Cities Service Gas Company is distributing industrial gas directly to consumers through the Kansas City Gas Company, St. Joseph Gas Company, Joplin Gas Company, Carthage Gas Company and Webb City & Carterville Gas Company, and that it is engaged in intrastate business as a public utility in the direct distribution of industrial gas to consumers from its mains. It should file with the commission its schedules of rates and rules for the sale of such gas and submit to the provisions of the Public Service Commission act.

In a separate opinion Commissioner English said of holding companies:

By the device of creating subsidiary and holding and associated companies having separate corporate existences, and by conducting part of the common business under the form of one corporation and another part under the form of another corporation, the regulatory powers of the commission are always hampered and often frustrated. This results even though the practice in question be adopted for sound business reasons without any intent to evade regulation. For the full regulation of the rates and service of the distributing companies involved in this proceeding it is essential that the commission have full and rightful jurisdiction over the pipe-line company in its relation to the distributing companies. And since it abundantly appears that it and the distributing companies are simply fingers of the same hand, I regard it as justifiable in law to ignore the separate corporate forms of the enterprise as being in effect their use to violate the public policy of the state. I regard the commission as justified in treating all the business in Missouri of all the companies in question as one single utility enterprise.

ONE-BEAM RADIO TAKES PROGRAM OVER RIVER



Directional radio transmission across the Hudson River on a narrow beam of neon light was demonstrated by General Electric engineers recently. John Bellamy Taylor, research engineer, conducted the experiment between a pier in New York and the new Dollar liner President Hoover, *at dock in Jersey City. A powerful neon tube changed the electrical impulses from the microphone into light waves. Projected in a beam, these were picked up by a mirror on the ship containing a photo-electric tube that changed the waves back to electric impulses.*

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Scattered Happenings in the Electrical Sphere

UNITED STATES

Galveston's New Rates

With the acquisition by the Houston Lighting & Power Company of the Galveston Electric Company the purchasing company has pledged itself to put into effect in Galveston the same rates that prevail in Houston with the exception of a rate for small industries about 25 per cent higher. For domestic light and power the rates will be: 7 cents net per kilowatt-hour for the first 3 kw.-hr. per room per month, 4 cents for the next 100 kw.-hr. per month and 2½ cents for all in excess. A minimum charge of 50 cents a meter will be made.

To Enlarge San Francisquito Plant

Completion of plans and specifications for the third unit of power plant No. 2 in San Francisquito Canyon has been announced to the Los Angeles Board of Water and Power Commissioners by H. A Van Norman, general manager and chief engineer of the Department of Water and Power. It will add 18,000 hp. capacity to the more than 40,000 hp. now operating in the plant, and the cost, including tunnel conditioning, will be about $1,000,000.

Terre Haute Company Changes Name

The Terre Haute (Ind.) Traction & Light Company, formerly a leased property of the Terre Haute, Indianapolis & Eastern Traction Company, which recently was acquired by Insull interests at a receiver's sale, has obtained permission from the Indiana Secretary of State to change its name to the Terre Haute Electric Company, Inc.

New York's New Rates Bring Protests

Asserting that in some cases increases in bills rendered to commercial customers of the New York Edison system under its new rates have reached 250 per cent because of the demand charge, Corporation Counsel A. J. W. Hilly of New York has written to Chairman M. R. Maltbie of the Public Service Commission asking that the companies be prevented from cutting off service until disputes shall be adjusted. According to Mr. Hilly, such a flood of complaints has reached his office that it may become necessary for him to establish a separate bureau to handle them.

$150,000 a Year from Yakima Project

Approximately $150,000 revenue a year will be afforded from the Moxee River power plant of the Yakima reclamation project, according to Erle J. Barnes, director of conservation and development at Olympia, Wash. In summer months at least 30,000 hp. will be furnished by the plant to be wholesaled to private power companies for about 4 or 5 mills a kilowatt-hour, Mr. Barnes states. In winter months, however, there would be hardly more than 4,000 hp. or 5,000 hp. for sale. This is the power plant which is to be built as part of the Cle Elum dam reclamation project alluded to last week (page 314).

Jacksonville Has Novel Relief Plan

The Jacksonville (Fla.) City Council has proposed to the citizens that they help build a fund for relief of the unemployed by adding 10 per cent to their electric light bills. Electrical facilities at Jacksonville are owned and operated by the city, and the Council estimated that its suggestion would provide $9,000 monthly. The plan is not compulsory.

Another Oregon Power District Proposed

A preliminary petition has been received by the Oregon Hydro-Electric Commission for the creation of a utility district in territory in the extreme

western portion of Lane County. The proposed project would consist of hydro-electric plants constructed along Lake Creek, a tributary of Triangle Lake, and the power generated would be marketed throughout the contemplated district. The development would be known officially as the "Triangle Lake Utility District." The petition has been submitted to the State Attorney General for examination as to its legal form. Lands in the Triangle Lake territory are very sparsely settled and used principally for recreational purposes and lumbering operations.

Doherty Company Cuts Kansas Rates

As intimated last week, the Empire District Electric Company has determined to cut its rates in Columbus and Baxter Springs, Kan. At Columbus the initial step will be 8 cents for 30 kw.-hr. —instead of 12½ cents for 15 kw.-hr.— and 5 cents, as before, for excess consumption. At Baxter Springs the same new rate will replace one of 10 cents for 50 kw.-hr. and 7½ cents for excess. This will bring substantial savings to customers in both cities.

North Carolina Commission Asks Data

An order issued by the North Carolina Corporation Commission requires public utility corporations operating electric, artificial gas or telephone properties in the state to file by September 30 copies of all written contracts and statements in full of all agreements in 1930 with holding, managing or operating companies or those engaged in the selling of service of any kind. Reports of all payments made to such companies in the eighteen months prior to June 30, 1931, are also required.

South Carolina Utility Appraisals

An indefinite extension of time from August 1 has been granted by the Railroad Commission of South Carolina to all electric power companies to file appraisals of their properties in compliance with a previous order of the commission. Some of the smaller companies have filed their appraisals, but none of the larger ones has yet been able to comply with the order.

Holston River Application Up

September 11 has been set by the Virginia Corporation Commission as the date of hearing on the application of the Holston River Power Company for permission to flood territory in Washington County, Va., through the erection of a dam near Kingsport, Tenn., in order to build a large hydro-electric plant (ELECTRICAL WORLD, June 20, page 1163). The Edmondson Electric Company of Abingdon, Va., opposes the project as interfering with a development contemplated by it.

Private Ownership Benefits Iowa Town

After voting three times on the sale of the municipal lighting plant to the Iowa Southern Utilities Company, Corydon, Iowa, finally approved the sale two years ago by 519 to 460. City officials recently joined in statements of satisfaction with the transaction. Domestic rates are 37 per cent less and the town's financial position is better than when it owned the plant, they say.

For Special Tax on Transmission Lines

Charles U. Becker, Secretary of State for Missouri and an active candidate for the Republican nomination for Governor, in a campaign address has declared himself in favor of special taxes on gas pipe lines and electric transmission systems. Revenue from the latter source he put at $3,000,000 annually.

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Coming Meetings

Rocky Mountain Division, N.E.L.A. —Stanley Hotel, Estes Park, Colo., Sept. 2-4. G. E. Lewis, 367 Gas & Electric Bldg., Denver.

Electrochemical Society — Hotel Utah, Salt Lake City, Sept. 2-5. C. G. Fink, Columbia University, New York.

Southwest Power Conference—Kansas City, Sept. 7-11. A. L. Maillard, 1330 Grand Ave., Kansas City.

Pennsylvania Electric Association — Bedford Springs Hotel, Bedford Springs, Pa., Sept. 9-11. H. A. Buch, Telegraph Bldg., Harrisburg.

Empire State Gas and Electric Association—The Sagamore, Bolton Landing, Lake George, N. Y., Sept. 10-11. C. H. B. Chapin, Grand Central Terminal, New York.

International Association of Electrical Inspectors—Eastern and Western Sections (joint meeting), Pittsburgh, Sept. 14-17. R. W. E. Moore, Westinghouse Electric & Manufacturning Co., East Pittsburgh, Pa. Southern Section, Dallas, Sept. 21-23. R. L. Gatewood, P. O. box 1743, Atlanta. Southwestern Section, Sacramento, Calif., Sept. 28-30. C. W. Mitchell, 914 Merchants' Exchange Bldg., San Francisco. Northwestern Section, Salem, Ore., Oct. 5-7. F. D. Weber, 414 Lumbermen's Bldg., Portland, Ore.

National Electrical Manufacturers' Association—New York, Sept. 16-18. A. W. Berresford, 420 Lexington Ave., New York.

American Welding Society — Copley-Plaza Hotel, Boston, Sept. 21-25. M. M. Kelly, 33 W. 39th St., New York.

New England Division, N.E.L.A.— Poland Springs House, South Poland, Me., Sept. 28-30. Miss O. A. Bursiel, 20 Providence St., Boston.

American Association of Engineers— Huntington, W. Va., Sept. 28-30. M. E. McIver, Willoughby Tower, Chicago.

Great Lakes Division, N.E.L.A.— French Lick Springs Hotel, French Lick, Ind., Oct. 1-3. T. C. Polk, 20 N. Wacker Drive, Chicago.

Association of Electragists International—Hot Springs, Ark., Oct. 5-8. L. W. Davis, 420 Lexington Ave., New York.

Illuminating Engineering Society—William Penn Hotel, Pittsburgh, Oct. 13-16. E. H. Hobbie, 29 W. 39th St.,, New York.

National Association of Railroad and Utilities Commissioners — Jefferson Hotel, Richmond, Va., Oct. 20-23. J. B. Walker, 270 Madison Ave., New York.

Wisconsin Utilities Association—Commercial Section, Oct. 22-23. Hotel Loraine, Madison. J. N. Cadby, 135 W. Wells St., Milwaukee.

American Institute of Electrical Engineers—District meeting, Kansas City, Mo., Oct. 22-24. F. L. Hutchinson, 33 W. 39th St., New York.

Empire State Men to Meet on Lake George

"The Utility Tax Burden," by State Tax Commissioner Mark Graves; "The Conference-Leader Method of Employee Training," by Arthur L. Mann of the State Department of Education; "Dealer Relations," by Alexander Forward, managing director American Gas Association; "Federal Encroachment on State Regulation." by Carl D. Jackson; "Farm Electrification," by Public Service Commissioner M. C. Burritt, and "The East Comes Back," by Harry Reid, vice-president N.E.L.A., are the titles of papers to be presented at the annual convention of the Empire State Gas and Electric Association at Bolton Landing, Lake George, N. Y., September 10 and 11.

Reno Utility Would Buy Truckee Plant

Subject to the approval of the California Railroad Commission, the Sierra Pacific Power Company, Reno, Nev., has entered into an agreement with P. M. Doyle to purchase the Truckee (Calif.) Electric Light & Power Company, of which he is the owner, president and general manager.

CANADA

Montreal Strike Ends

The strike of 175 linemen of the Montreal Light, Heat & Power Consolidated, which was marked by almost daily dynamiting of steel towers carrying high-tension transmission wires, blowing up of poles, cutting of wires and other destructive acts, has ended and 135 of the workers have returned to their posts. Three former linemen are charged with depredations.

Navigation and Power in Manitoba

Far-reaching consequences regarded as detrimental to the development of water powers in Manitoba are seen by civic officials if Winnipeg signs an agreement demanded by the federal Department of Public Works in connection with the city's Slave Falls plant on the Winnipeg River. To protect navigation the Dominion government asks both the city and the local utility company to give the government power to take over the plants at any time. The undertaking provides for the erection of the locks at the Slave Falls and Seven Sisters plants, if necessary; it gives the government the right to remove both plants if it sees fit and confers the power of expropriation.

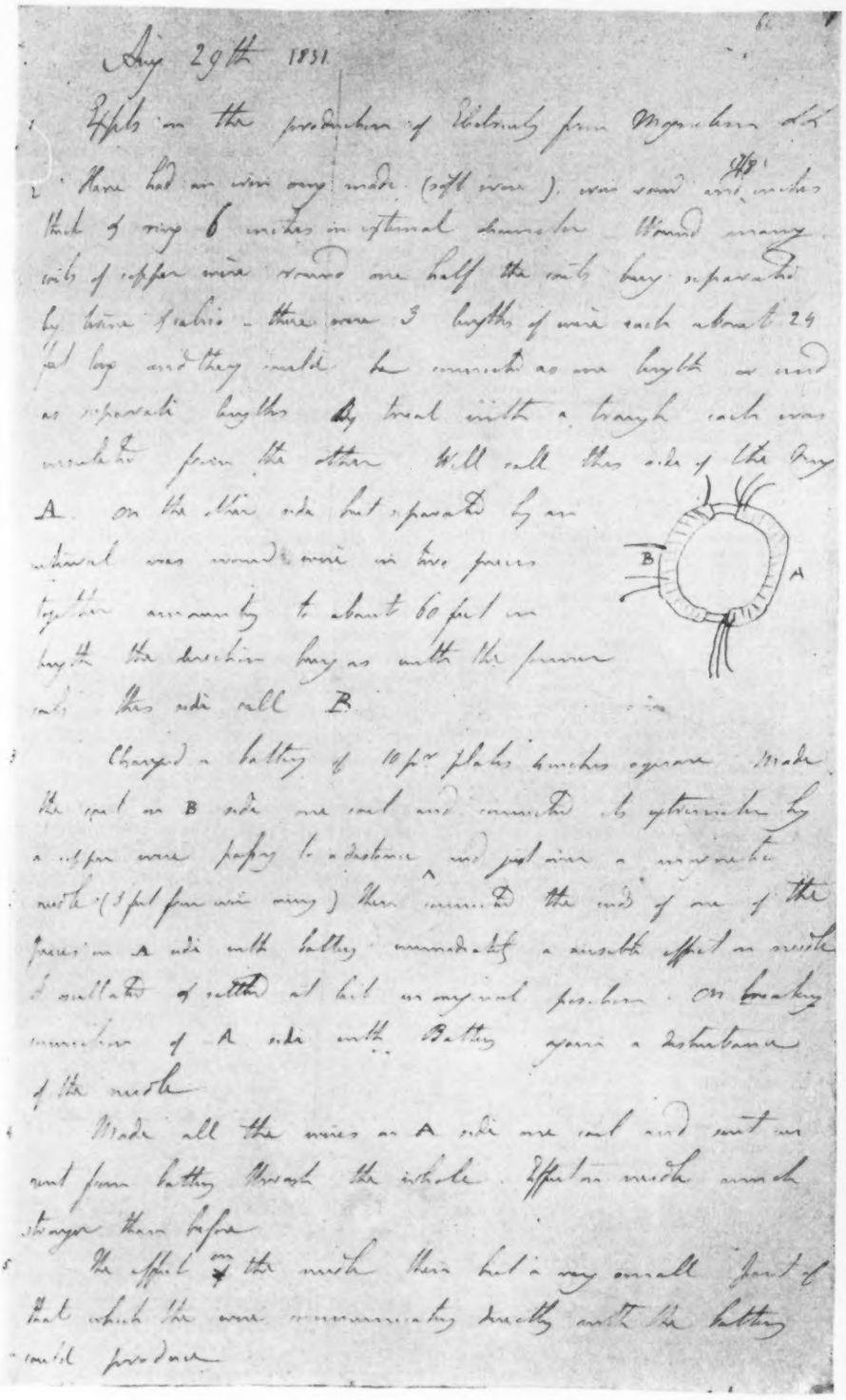
ABROAD

N.I.A.T.M. to Meet at Zurich

Zurich, Switzerland, will be the first meeting place of the New International Association for Testing Materials on September 8-11. Papers and discussions will fall under four groups: (a) metals, (b) non-metallic inorganic materials, (c) organic materials, and (d) "questions of general importance." American engineers will take part.

Centennial of Faraday's Discovery of Electromagnetic Induction

Today (August 29) is exactly 100 years since Michael Faraday (1791-1867) recorded in his diary his discovery of the principle of electromagnetic induction. Though the independent discovery of this principle by Joseph Henry, the American physicist, appears to have antedated Faraday's, Henry was not enabled to put his experiments to practical use, and the modern art of electricity is largely built on Faraday's demonstrations and developments. Next month the Faraday centennial will be elaborately celebrated in Great Britain under the sponsorship of the Institution of Electrical Engineers and the Royal Institution, with 30 associations participating.



Aug 29th 1831

Effects in the production of Electricity from Magnetism &c

Have had an iron ring made (soft iron), iron round and 7/8 inches thick of ring 6 inches in external diameter. Wound many coils of copper wire round one half the coils being separated by twine & calico – there were 3 lengths of wire each about 24 feet long and they could be connected as one length or used as separate lengths. By trial with a trough each was insulated from the other. Will call this side of the ring A. On the other side but separated by an interval was wound wire in two pieces together amounting to about 60 feet in length the direction being as with the former coils; this side call B

Charged a battery of 10 pr plates 4 inches square. Made the coil on B side one coil and connected its extremities by a copper wire passing to a distance and just over a magnetic needle (3 feet from iron ring). Then connected the ends of one of the pieces on A side with battery; immediately a sensible effect on needle. It oscillated and settled at last in original position. On breaking connection of A side with Battery, again a disturbance of the needle.

Made all the wires on A side one coil and sent current from battery through the whole. Effect on needle much stronger than before.

The effect on the needle then but a very small part of that which the wire communicating directly with the battery could produce.

Faraday at time of discovery

(From a contemporary painting by H. W. Pickersgill, R.A.)

Aug. 29th, 1831.

1. Experiments on the production of Electricity from Magnetism, etc. etc.

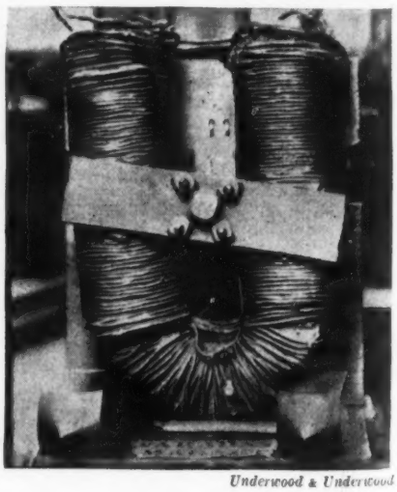
2. Have had an iron ring made (soft iron), iron round and 1th inches thick and ring 6 inches in external diameter. Wound many coils of copper wire round, one half the coils being separated by twine and calico—there were 3 lengths of wire each about 24 feet long and they could be connected as one length or used as separate lengths. By trial with a trough each was insulated from the other. Will call this side of the ring A. On the other side but separated by an interval was wound wire in two pieces together amounting to about 60 feet in length, the direction being as with the former coils; this side call B.

3. Charged a battery of 10 pr. plates 4 inches square. Made the coil on B side one coil and connected its extremities by a copper wire passing to a distance and just over a magnetic needle (3 feet from iron ring). Then connected the ends of one of the pieces on A side with battery; immediately a sensible effect on needle. It oscillated and settled at last in original position. On *breaking* connection of A side with Battery, again a disturbance of the needle.

4. Made all the wires on A side one coil and sent current from battery through the whole. Effect on needle much stronger than before.

5. The effect on the needle then but a very small part of that which the wire communicating directly with the battery could produce.

Original electromagnet made by Faraday



Underwood & Underwood

EDITORIALS

L.W.W.MORROW
Editor

"Let the government do it"

A CLIMAX to weak business leadership is the prevalence of opinion that the government should step into the depression through active interference with American business. The depression is declared to be so dire and unparalleled that emergency measures are necessary, and these, it is held, can be had only by governmental feats. Guaranteed banks, guaranteed deposits, subsidized wages, subsidized employment, low-interest money loans by government for building construction and for factory modernization and an unprecedented enlargement of public construction programs are some of the suggestions made for government to act upon. Instead of no interference of government with business, a policy of letting the government run business too frequently meets with favor in business circles.

Apparently the slow but insidious poison of socialization, emanating from Europe, is causing a diseased condition because of which even business men contemplate throwing overboard the American conception of individualism. Steady pressure from academic economists and "save-the-nation" politicians is getting results sufficient to challenge believers in the true American view of business and government and to rouse them to take positive action.

It is time for American industrial executives to become hard-boiled. Years of soft living seem to have weakened the fiber of too many business men. Apparently they have forgotten that it is necessary to be tough when times are tough, as were the Morgans, Harrimans, Rockefellers and others of that vigorous breed of pioneers who hewed and plowed their way to success and created the structure on which was built the business of today. There are too many non-authoritative committees trying to function as business executives at a time when decisions and action should be personalized in business—committees are but the result of lack of executive courage. Aggressive leadership is absent in too many individual business enterprises.

The American conception of business and the policy of non-interference of government in business must be maintained. We believe this depression will be overcome through the working of business principles applied by business men and not by panaceas prescribed by politicians for administration by governmental bureaus. We believe, moreover, that this depression is salutary, for it brings to bear upon business executives the principle of the survival of the fit, and it will create, therefore, the able business leaders needed to maintain American progress in the future. It will make business and business men efficient. It will not make a business enterprise of government.

Business men should see to it that in the coming session of Congress the initial political moves toward socialization by business legislation are blocked. They should act and act at once to show that each business enterprise has a plan and a program for meeting the present depression without governmental aid. They should assert their purpose to see that none shall lack for food, clothing and shelter in the coming winter, but they should fight vigorously the idea that unemployment is an excuse for government participation in industry and the rejection of American ideas.

And in this realm of national service business men of the electrical industry should take leadership. Their industry is proof of the success of time-tested principles, and its future is jeopardized by the false prophets inside and outside business ranks. It is a time to fight and fight hard against contamination by those preaching principles abhorrent to our American conception of living and business conduct.

Is the N.E.L.A. convention exhibit worth while?

LETTERS have just gone out announcing the 1932 N.E.L.A. convention exhibit. This raises again the question of the practical worth of these great equipment shows into which so much money and effort go.

Manufacturers felt that they had just cause for complaint last June because so many power-company engineers and junior executives had been told to stay home and save money. The exhibitors had made a large investment, for these times, to set before the industry an elaborate display of engineering equipment and load-building appliances. There had been no exhibition the year before and there was much to show. It seemed unfortunate that the power companies, which were prospering, should elect to do the economizing and keep away from the convention the men for whom the exhibition was prepared.

Some utility executives countered by questioning the value of these great exhibitions that have been a feature of the big convention for many years, asking whether, after all, so large an expenditure is warranted. The point is worth considering. But the answer is clear, when the cost is reckoned against the fact that the electrical industry is now doing an annual business of four billion dollars and that a presentation of manufactured products once a year is an educational opportunity of great value to these many thousand purchasers of apparatus and appliances. The manufacturers have found it good business to set up this great marketplace and make this large-scale contact between buyer and seller. The best proof of this is the fact that they have continued to do it. The real issue is whether or not this great convention show is being properly capitalized by both exhibitors and delegates to get the most out of it for the benefit of the entire industry.

The N.E.L.A. exhibit is only one of several that are held at Atlantic City every summer on this large scale. Their value has been demonstrated for years in many industries. The disappointments of last June would therefore suggest the advisability of a well-planned effort to organize the electrical industry's exhibition in 1932 on a better co-operative basis that will insure two things—first, better showmanship to emphasize the educational features of the display, and, second, a full attendance of those electrical men who are concerned with the selection of equipment and appliances. A joint committee of exhibitors and power-company executives might well be appointed to work it out.

Study the impulse strength of wooden-pole construction

IN THE economics of construction, maintenance and performance the resurrection of wooden-pole construction methods as an alternative to the prevailing steel construction for some of the higher-voltage lines has been urged. Much has been learned about the performance of steel-tower lines under lightning impact, but the wooden-pole line remains largely in the realm of opinion and conjecture, with a scarcity of performance and test data to clinch thinking and practice.

Clouds of doubt about steel-tower lines were largely dispelled by cathode-ray oscillograph studies and statistical analyses. The latter can, of course, be made available for such higher-voltage wood-construction lines as exist. In the meantime the apparatus, technique and staffs perfected during the last four or five years of intensive lightning studies on actual lines could very profitably be applied to a study of experimental wooden-pole assemblies.

The problems involve quite different elements. Wooden-pole inquiry necessitates more study of individual structure and less of the line as a whole. What does the overhead ground wire do to the impulse resistance of each pole? How much does the pole ground wire insure against shattering? Should guys be insulated, and with porcelain or wood? How much gain would come from substituting wood for metal braces, and what departures from conventionality should there be in connection with the rest of the pole hardware? Shall pins be manufactured of wood or of metal?

The cathode-ray oscillograph and allied equipment could do an excellent service in this realm if it were applied to a study of these individual elements and progressive assemblies of them. When enough has been established to justify it, an experimental line could be built to incorporate the lessons learned. If it should depart substantially from prevailing wooden-pole practice, the convincing answer would then rest upon surge tests on the experimental stretch and the latter's

behavior in summer service. Wood deserves this chance to match itself against steel, and the occasion is ripe to afford it.

Lightning protection for distribution transformers

MORE systematic study of distribution transformer failures due to lightning deserves the consideration of operating engineers. Evidence is accumulating that in some cases distribution transformer troubles per transformer per storm developing in specific areas may be reduced perhaps 50 per cent by patient investigation of lightning incidence, proper location of arresters, grounding and the replacement of old transformers by those of modern design.

The line of attack on the problem is clearly marked. Comprehensive records are of the utmost importance. The spotting of failures and of storm damage is vital information. Much light may be thrown upon these troubles if they are itemized and segregated as to causes and damages sustained, whether through blown fuses, coil punctures, grounds, lead or bushing difficulties. The study of the relation of failures to sizes of units is important. Here the smaller ratings are likely to appear relatively prominent on account of their logical use in less thickly settled areas and because of reduced internal clearance and other design features.

It would be easy to lay a request for complete distribution system protection upon the executive desk on the assumption that since in general lightning arresters reduce outages, 100 per cent outfitting is desirable. A far better approach in times like these is to determine the areas more susceptible to trouble and the age and design of units least justifiable to remain in service. The shielding effect of buildings and other structures in thickly settled areas appears to be more valuable than was formerly realized. Ground resistances above the order of 100 ohms appear to have little material effect upon arrester performance as values increase, but below 100 ohms successful operation seems to be more and more assured as one goes downward.

A great deal of valuable information specifically applicable to individual systems lies within reach of distribution engineers who are prepared and authorized to organize inquiries into the location, frequency, severity, causes and remedies identified with lightning disturbances on the moderate-voltage circuits utilized in serving the large majority of power-company customers outside the direct-current or low-voltage network areas of the principal metropolitan centers.

Danger of axiomatic thinking

A PAPER was recently presented concerning the effect upon generators of load variations and breakdowns in electrical distribution systems. In discussing the time lag in the governor before it responds to the results of a short circuit upon the system, the author points out that it is fortunate that the mechanical governors do not function very quickly because if they did they would create the reverse condition of that required in the circumstance. He then goes on to develop the idea that a short circuit implies an increased consumption of energy, and since it is not desirable that a fault should be fed more than can be helped, it is fortunate that the governors do not act very quickly, because otherwise they would tend to increase the amount of power available for feeding the short circuit.

This example is cited in detail as typical of the false reasoning that can be developed on the basis of an assumption as to the correctness of a statement or a fact that seems almost axiomatically true. In this case, for example, it seemed so obvious that a short circuit implies a heavier load on the machine. The facts, however, are not, of course, in harmony with this assumption. Some short circuits, it is true, do impose heavier load on the machine by virtue of the high resistance of the short circuit, but the majority of short circuits result, as has been proved by test, in unloading the machine, and the trouble that arises with governor action is due not to the fact that the machine has increased its load but rather to the fact that the machine has lost its load and the governor has not been quick enough to adjust steam admission to the machine in proportion to the lightened load.

A situation of the type described more than ever bears out the necessity, if sound reasoning is to be assured, of questioning every fact or every statement in a process of reasoning regardless of how obvious the truth of any of these statements may appear to be.

Why Domestic Customers Use 4,000 Kw.-Hr. per Y

Customer receptivity, low rates, small fuel competition and co-operation of contractor-dealers largely account for highest residence consumption on the continent

IN WINNIPEG, Canada, a city of more than 200,000 population, 55 per cent of the residence users of electricity cook on electric ranges; 40 per cent of them use electric water heaters; 100 per cent own electric irons, 45 per cent operate toasters and vacuum cleaners and 30 per cent have electric washers. It is estimated that the 60,000 domestic customers own and use:

60,000 irons	5,000 refrigerators
32,500 electric ranges	3,000 percolators
27,000 toasters	1,300 floor polishers
27,000 vacuum cleaners	1,300 waffle irons
23,500 water heaters	600 electric clocks
18,000 washers	500 ironers

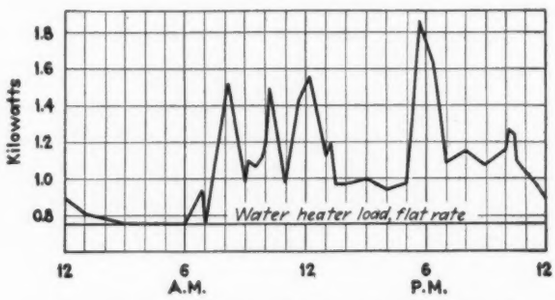
These figures are sufficiently impressive without adding to them the number of radios, ventilating fans, health lamps, floor lamps, table lamps, food choppers, drink mixers and other electrically operated devices that give comfort to the Winnipeg home. The use of all appliances has raised the average consumption per year of domestic customers to more than 4,000 kw.-hr.

This result has been achieved not by any unique plan or formula, but as a result of several conditions and practices. Of primary influence is the customer receptivity to new ideas and methods. Then there is the determination to eliminate or avoid "bottlenecks" to service in the form of inadequate wiring or insufficient outlets. Following of merchandising practices that take into consideration the self-interest of customers, contractor-dealers and salesmen contribute in no small measure. And finally, there are the lowest domestic rates in North America and negligible competition of fuel.

The customer is receptive

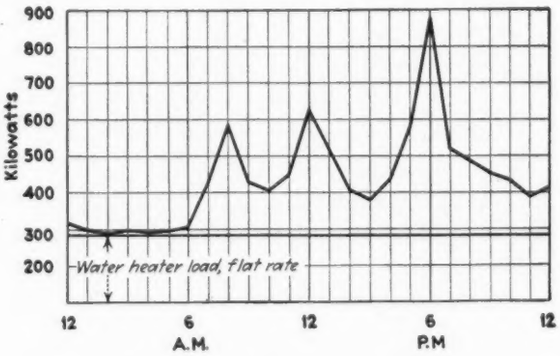
The attitude that welcomes and seeks the new and modern is a definite characteristic of that class of people (whether they are rich or poor) who strike out from the settled areas and clear farms and build cities where before there was only earth and sky. The new communities are not weighed down with the physical impediments of old habits and methods of living which must be shed before new ideas can be adopted. The seller of domestic appliances does not find his prospective customer already in ownership of a gas range so frequently as in older, settled areas. New ways of living, as exemplified by the generous use of electricity, do not have to overcome older living habits before they can be accepted. This pioneer attitude, for it is truly that, plus the fact that the new things do not have to displace the old, explains in large measure the high saturation of electrical appliances in the Southwestern, Rocky Mountain and Pacific Coast areas of the United States. In the sense of population density the Canadian West is much newer territory than even these areas, and the collective psychology of its people is proportionately more receptive to newer ways and appurtenances of living.

This condition must not be overlooked in considering



Average well-equipped home has this load

The graph represents an adjusted average of tests made during March and April covering 63 domestic customers in medium residential districts. It includes lighting, range, flat-rate water heating (¾ kw.) and miscellaneous appliances. The connected load in this average home probably exceeds 12 kw.



The load on the circuit feeder

This feeder supplies an area of 0.673 square mile in a medium residential district. The two lower peaks represent range and table appliance load, while the third shows the coincidence of these loads with lighting. The demand of flat-rate water heating on substation and circuit feeder capacity is very apparent. Conditions shown apply to October 17, 1930.

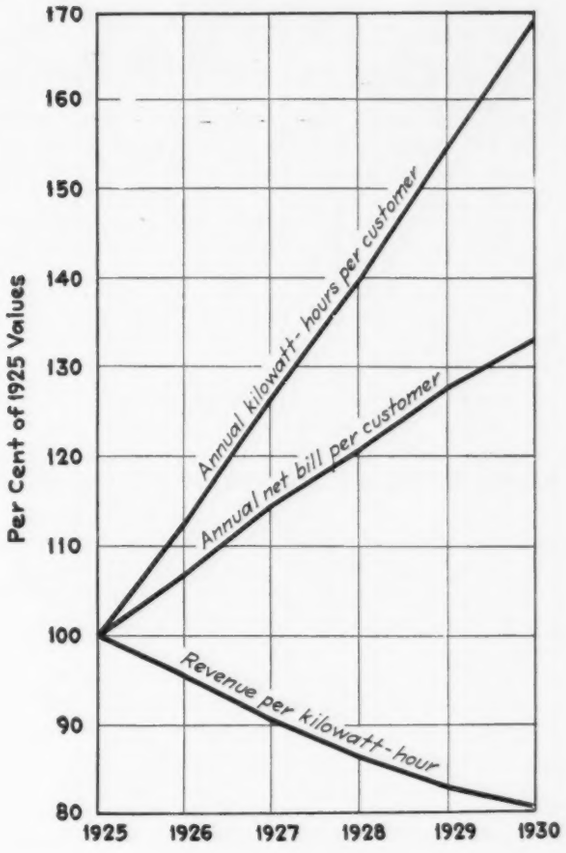
Year in Winnipeg

the causes for the 4,000-kw.-hr. average residence use of electricity in Winnipeg.

A definite factor in the really remarkable domestic electrification of Winnipeg is the whole-hearted support that contractors and utility men have given to the "Red Seal" plan in their organization, the Manitoba Electrical Association. Out of 876 residences, comprising 516 single dwellings and 360 apartment suites and flats, in 1930 there were 594 applications for certificates, and only 55 were disqualified by failure to pass inspection. The total number of outlets in the 251 Red Seal single dwellings included above was 18,925, or an average of 75.4 per home. These are divided in the following amounts:

Ceiling outlets	15	Convenience outlets	19
Bracket outlets	21	Special outlets	5
One-way outlets	12		
Three-way outlets.....	3.4	Total	75.4

How these figures are reflected in business for the contractor and in merchandise sales is shown by the local estimate of $40 additional per job to the contractor for wiring to Red Seal specifications and $100 for appliances that would not be used in a non-Red Seal home. To these is to be added $64.40 for more and better fixtures, which brings the total to $204.40 as the contribution of Red Seal, exclusive of energy, to better living of the domestic customer and to prosperity of the electrical industry. In this figure of $204.40 there is represented $154.50 in business to the contractor and retailer, $135.80 to the jobber, $119.44 to the manufacturer and $50 to the utility as a merchandiser.



Excerpts from Electric Rate Schedule

(Discounts have been omitted)

Lighting

Residential Rate—3½ cents per kilowatt-hour for the first five kw.-hr. per 100 sq.ft. of rated floor area per month, plus 1 cent per kilowatt-hour for all excess monthly consumption. (Minimum floor area rating, 1,000 sq.ft.; maximum floor area rating, 3,000 sq.ft.) Subject to a net minimum monthly charge of 50 cents per meter.

Power

Commercial or Residential Rate—The first 50 hours' monthly use of total connected load at 3.33 cents per kilowatt-hour; next 50 hours' use, 2.5 cents; next 50 hours' use, 1.9 cents; next 50 hours' use, 1.4 cents; next 50 hours' use, 1.1 cents; excess of 250 hours' monthly use of total connected load at 0.8 cent per kilowatt-hour. Subject also to a net minimum monthly charge of 75 cents per horsepower of total connected load, not to be less than $1 per month per meter.

Heat

Residential Rate—1 cent per kilowatt-hour. Subject to a net minimum monthly charge of 50 cents per meter. Applicable to water heaters only where installations are not in excess of 1 kw. for each 30 gal. of tank capacity.

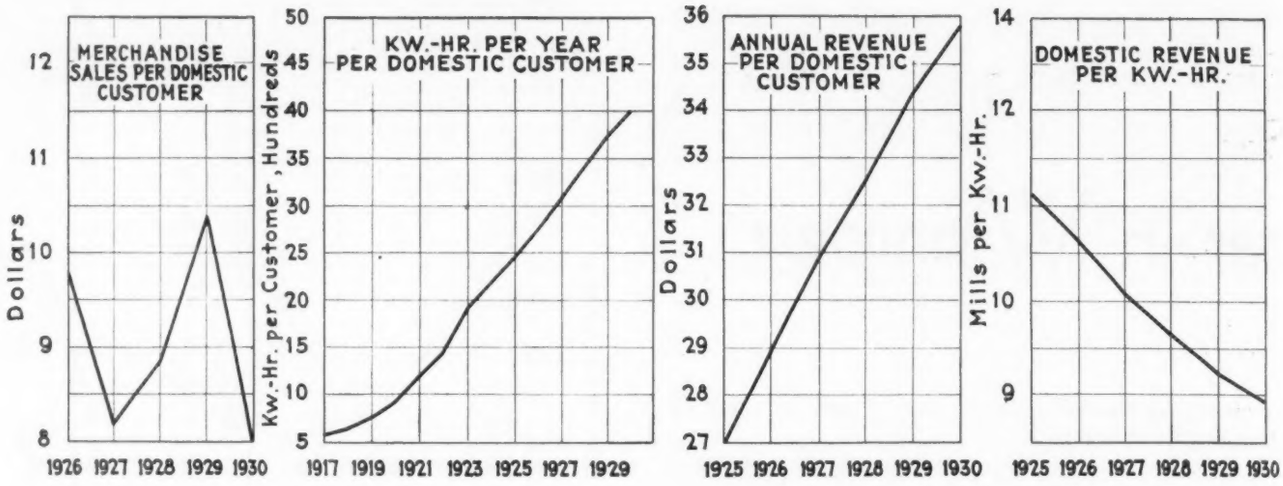
Residence Flat Rate for Water Heating:

Watts per Heater	Gross per Month
500	$1.66
750	2.50
1,000	3.33
1,500	4.44
2,000	5.55
Over 2,000	2.22

Merchandising is continuous, not sporadic

In the Winnipeg metropolitan district there are six utility merchandise stores. They are spotlessly clean and well kept, with goods arranged and displayed to the best selling advantage. Seventeen salespeople are employed in these stores on straight salaries that range, as a mean, from $1,200 to $1,800 per year. Salesmen in the field number 34. They work on commission only and average around $1,500 per year on the 10 per cent compensation allowed. Salesmen's commissions are based on nothing more than the merchandise they sell; they receive no bonuses nor other added incentives figured on load building for increased revenue. When domestic loads arrive at such good load factors as prevail in Winnipeg the policy of a load-building subsidy of merchandise sales is no longer considered justifiable by the companies.

Special campaigns, in the sense of increased advertising and concentration of selling effort, are made on definite appliances in those months of the year when these appliances have seasonal appeal. But these campaigns are merely intensifications of activities that are continuous throughout the year. It is not the practice, for instance, to sell ranges for one month and then forget about them for eleven. All sales are made at list prices, plus nominal carrying charges for time payments, which, depending on the appliance, range from 5 to 12 per cent down and run in no case longer than 24 months.



So far as the actual selling of merchandise is concerned, dealers stand on their own feet. They may purchase from the utility stores at a dealer discount merchandise for resale to their own customers, but receive no preferential treatment beyond this.

Utility merchandise sales totaled $489,000 in 1930. Of this amount $172,000 was disbursed in selling expense, 35.2 per cent. Of the expense 4.9 per cent went for rent and overhead for merchandising space, 58 per cent for salaries and overhead, 16 per cent for commissions and 11.8 per cent for advertising. The 1930 sales, excluding lamps, are estimated to have added 10,530,000 kw.-hr. to the annual domestic energy consumption, roughly $1 of revenue for each $5 spent by customers for merchandise.

The same fairmindedness that refuses to coddle the dealer as a merchandiser accords to the wiring contractor the fullest co-operation when he enters the picture as the installer of major appliances. He does his work and the utility pays him for it, adding the cost to the price of the appliance to the customer. In the case of the range the installation cost averages $27.50 and this is added to the list. Installed with a range it costs on the average $5 to put in a water heater; alone, the cost would be $9.75.

Reason why low rates are possible

There is in the Winnipeg situation a basic natural condition that explains the generally low scale of rates. Providence smiled on Manitoba when the Red Gods cut her rivers and dug her lakes. Nowhere in North America are there better conditions for the development of low-cost hydro-electric power. This statement does not except even Niagara, because treaty restrictions and scenic preservation are preventing the fullest development of Niagara.

The drainage area of the Winnipeg River, flowing into Lake Winnipeg, is 55,000 square miles. The flow of this watershed is comparable to that of the St. Lawrence basin. The river has a minimum flow of 2,000 sec.-ft. and its variations fit in unusually well with the normal seasonal changes in power demands. The topographic and geologic conditions along the river are ideal for hydro development. The average distance of transmission from the generating points to the city of Winnipeg is about 70 miles. A total of nine lines enter the city from all of the plants.

These facts of superlatively favorable conditions of hydro-power development, coupled with an extreme simplicity of system design that contains few of the special arrangements and devices that are used on many systems in the United States to protect service continuity, contribute to very low unit costs. The final cost per kilowatt of unity load factor delivered to the customer's meter, taking into account line losses, conversions and system uses of energy, is estimated to be of the order of $400, in which hydro capacity is only $100, or even less for some of the plants. Taking a figure of eight years for turnover of property value to earn a reasonable return on a purely water-power system results in revenue of $50 per kilowatt per year, or about 6 mills for energy at unity load factor as the minimum rate limit. It appears from this rough analysis that there is a lot of power to be sold in Winnipeg and also that it can be sold at a remarkably attractive rate.

Winnipeg Gas Rate

(All rates are net)

First 400 cu.ft. or any part thereof	$0.75
Next 4,600 cu.ft., per thousand	1.20
Next 20,000 cu.ft., per thousand	1.15
Next 25,000 cu.ft., per thousand	1.10
Next 50,000 cu.ft., per thousand	1.05
Next 200,000 cu.ft., per thousand	1.00
300,000 cu.ft. and over, all at per thousand	0.95
Special rate—water heating and residence or building heating, per thousand	0.75

Gas competition is not strong

In most cities of the United States gas service for domestic cooking and heating has the edge on electricity when it comes to a straight comparison of rates. This is true also in Winnipeg, for the rate for gas for usual domestic use figures to about 0.0021 mill per B.t.u., while for electricity it is 0.0027, about 25 per cent higher; but when one considers the more efficient utilization of electricity in heat applications, the actual operating cost of gas in domestic uses is really higher than the cost of electricity. This does not take into account the greater convenience and cleanliness of the latter, so that in the city of Winnipeg it can hardly be said that gas competition is a factor. The gas rate is high because of the cost of coal.

Service Interruption for Repairs Should Be Announced*

By H. A. MARTIN
Chief Engineer People's Light & Power Company

More and more it is becoming necessary to prevent any interruptions of service, no matter what the cause may be, on account of the customer's modern conception of continuous supply. Public utility employees have responded to this demand for uninterrupted service with a zest, and increasingly more work is being done without any interruptions. Distribution lines are being worked "hot," high-tension lines are being repaired with "hot-line tools," and spare equipment is being provided to reduce the probability of outages.

In these days when our service supplies the kitchens of homes and hotels, the elevators of office buildings and industries, and the working medium for power, heat, light and time, any interruption is indeed disconcerting to consumers. Therefore it becomes increasingly important to notify consumers wherever practical when it is necessary to discontinue service for work on the lines.

When extensive prearranged interruptions are necessary over a period of several days a notice should be placed in the newspaper in the town being served that the service will be interrupted and this notice should state why the interruption is necessary and give a definite schedule of hours and dates during which no service may be expected. It is necessary to comply strictly with such schedule of service outages as printed in newspapers to prevent adverse comment and justified criticism.

Where the service outage is for an afternoon only or during a short period, and time is not available to print notices of discontinuance, the customers who would be most inconvenienced should be called on the telephone and the reasons for the discontinuance explained. A record should be kept of those called, and if any desire to be called back when service is resumed, this should be done.

Keep the customer informed. Have him understand your movements and the reasons for them. It is his business as well as ours. He wants to know when he cannot cook and do other things, and it only fair that we let him know. Be fair with the customer and he will be fair with you.

One of a series of employee instruction sheets developed by the People's Light & Power Company to bring about greater consideration of customers' interests.

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Odd-Frequency Areas Shrinking

Elimination of other frequencies and the establishment of 60 cycles as the standard for general service is now virually an accomplished fact throughout the United States, except in the great southern California district, where the standard is 50 cycles.

In a few areas, mainly because of the magnitude of the task, the transition has not been completed and other frequencies are still in use, though the list of such places is far smaller than a similar one compiled only a few years ago.

The accompanying table, showing those areas and the companies serving them, is based on the 1931 issue of the McGraw Central-Station Directory, supplemented by direct inquiries.

Where companies operate at more than one frequency an effort has been made to exclude those using the old frequency for power purposes only, so that the list applies essentially to domestic service. The number of customers covers all classes and all frequencies, since segregated figures are not usually available. In most cases of double frequency this means that only a fraction of the number is served at other than 60 cycles.

Meanwhile the change to 60 cycles is proceeding apace, on the part not only of those companies specifically noted but also of others for which no data as to the progress being made are at hand. In using the tabulation this prospect of changes must be kept in mind.

Companies Supplying Other than 60-Cycle Alternating Current for Domestic Service

Frequency, Cycles	Company	Towns Served and Total Customers (All Frequencies)
50	Dept. of Power and Water, Los Angeles, Calif.	Los Angeles and Wilmington, Calif. Customers—263,100
50 and 60	Southern California Edison Co.	Many towns in territory adjacent to Los Angeles Customers—447,098
50	Municipal Light & Power Dept. Pasadena, Calif.	Pasadena, Calif. Customers—11,368
50 and 60	Municipal Electric Plant, Riverside, Calif.	Riverside, Calif. Customers—11,368
25 and 60	Terre Haute, Indianapolis & Eastern Traction Co.	Terre Haute and several adjacent towns Customers—28,200
25	Keokuk Electric Co.	Keokuk and Montrose, Iowa; Hamilton and Warsaw, Ill. Customers—5,965
40	Rumford Falls Light & Water Co.	Canton, Dixfield, Mexico, Peru, Ridlonville and Rumford, Me. Customers—4,429
25 and 60	Consolidated Gas, Electric Light & Power Co. of Baltimore	Baltimore and many adjacent towns in Maryland Customers—236,121
30 and 60	Consumers Power Co.,† Western Division	Michigan, vicinity of Grand Rapids and Muskegon Customers—113,840
40	Groveton Electric Light Co.	Groveton, Northumberland and Stratford, N. H., Guildhall, Vt. Customers—834
25 and 60	*Buffalo General Electric Co.	Buffalo and a number of adjacent towns in New York Customers—181,383
25 and 60	Niagara, Lockport & Ontario Power Co.	Serves a large number of towns in Niagara Falls region Customers—58,738
25 and 60	New York State Gas & Electric Corp.	Serves a large number of towns in central and western part of New York Customers—140,036
25 and 60	Rochester Gas & Electric Co.	Serves Rochester, N. Y., and many adjacent towns Customers—119,455
133	Municipal Electric Light Plant	Lebanon, Ohio Population—3,214
25 and 60	Toledo Edison Co.....	Toledo and many adjacent towns in Ohio Customers—97,760
40 and 60	Broad River Power Co.	Serves Columbia, S. C., and many adjacent towns Customers—15,403

* Work is being carried forward as rapidly as possible to change 100,000 residential customers in Buffalo from 25-cycle to 60-cycle service. About 40,000 had been changed on December 31, 1930.

† Large force changing to 60 cycles as rapidly as possible. Changed 26,000 residential and commercial customers and much industrial power during year.

Regional Federal Regulation a Beneficial Necessity

By MARCEL GARSAUD
Member Federal Power Commission

POWER interests oppose federal regulation mainly on three grounds: First, because they believe that regulation is purely a matter of competition and is therefore automatic and easily responsive to competitive conditions, either of service or of prices; second, the power officials at present prefer state regulation and stress the point that state regulatory bodies have been successful in maintaining low rates when action on their part becomes desirable; third, their statisticians point to the small percentage of interstate transmission of electric current and question, therefore, whether any public benefit will be derived from the regulation of such a small amount of the total electrical output.

Most of the states oppose federal regulation on the ground that it will eventually result in an encroachment of states' rights and rob the states of their present control of service, rates and securities.

On the other hand, federal regulationists argue that state regulation has broken down and that, while the percentage of interstate traffic to total consumption is small (about 13 per cent), the actual transmission of current as between individual states is in many cases very large. These advocates of federal regulation, however, desire to keep states' rights inviolate and propose legislation intended to provide government control through joint action by states.

Both sides appear to be lining up their forces to "win the war." We should concern ourselves with the terms of the treaty of peace. The public is vitally interested in that. The interests of the consumer and the prosperity of the electrical industry are of far greater importance to our national happiness than any advantage of mere victory to either camp.

The interest of the consumer lies in the best possible service at the lowest reasonable rates, equitably proportioned among the characteristic groups of consumers. The prosperity of the industry depends on sufficient financial showing that profits will be ample to provide a legitimate return on money honestly invested plus encouragement for needed expansions of that part of the industry rendering a public service. Our welfare and happiness rest on that solution of the problem which will so fuse those two economic conditions as to cause no social and political disturbance.

Debates on the merits of federal regulation have reached the point of saturation. Much attention has been given in proposed legislation to the agencies and to the machinery intended to function in the exercise of federal regulation of interstate commerce in electric current. We should now give some thought to the subject matter itself, namely, best possible service at lowest reasonable rates and fair compensating profits. What do these terms mean? Shall we enact legislation establishing federal regulation and then leave it to an administrative body, and to the courts, to attempt to define the economic meaning of such words and to determine what combination of elements will constitute them facts? Shall the public, through Congress, lay down the principles involved in findings such as honest investment, fair profits, reasonable rates, adequate service, required expansions? Shall we ignore the experience to date of the Interstate Commerce Commission in its fixing of rates and determination of valuations, or shall we profit by it? Our statesmen must decide these questions. But certainly the public, inclusive of the consumer and of the investor in the industry, should know first what the conflict is about. Is the attack solely in the interest of the consumer? Is the stubborn defense merely for the pocketbook of the industry? Or, is the goal the national welfare? The public has the right to be informed concerning the intended terms of peace before the smoke of battle clears, to know in a general way the intended administrative enforcement of regulatory laws before any legislation is passed. Signs point to a strategic reserve which cannot at this time be assigned to either

belligerent, but whose strength must, and unquestionably will, be thrown to the side whose terms of peace take into account the national well-being.

Best possible service, legitimate reasonable rates and fair profits are component parts of a system of public utilities as important as costs, demand, necessity, availability and other requisites of the same system. No absolute or relative value can be given to any of the three components about which legislation is sought unless the physical and economic realm of the system is fully understood, the part played by each member of the system within the realm is fully assayed and the relationship between systems themselves well established. No sound logic has ever been convincingly presented supporting the much-worn-out methods of determining adequacy of service, reasonableness of rates and fairness of profits.

True valuation is honest minimum investment

Adequacy of service has been measured by the response of the public to propaganda for increased use. That is important, but it should not be the sole consideration. The best possible service should be not only that which the public is ready to buy, but that which the public is entitled to have from those who own and manage utilities that vitally affect the business and the home of the citizen.

Reasonable rates, and consequently fair profits, have been figured on a percentage of an arbitrary valuation of the properties used in the service rendered. Valuation of public utility properties is a most difficult task and is often determined by a most unstable formula. The elements usually considered by regulatory bodies and by the courts in arriving at a fair value vary from time to time with any given company, for different plants of the same company, for different locations of similar plants of the same company, for plants and groups of plants of one company as against those of another company, and vary even as between systems of plants. Too many variables compose this formula for general application and we should reduce it to terms less affected by scattered conditions and by a multitude of personal equations. A true valuation is the honest minimum investment.

Investment a more appropriate value than formulistic appraisal.

Criterion is superior service, judicious investment, low rates and appropriate profit.

Regional operation surmounts state capacity to regulate—federal supervision needed.

Motivation of regional consolidation should be publicized.

New regional surveys by government advocated.

Local rates are in province of local regulation.

Greater volume of business under good management in any enterprise generally means lower production costs, and, under a wise public policy, lower costs to the consumer. Greater volume of business, however, calls for additions and extensions to plants and a general expansion of the service. It cannot be attained without increased costs of salesmanship, of engineering, of construction and of management. That means additional money. New money must be led into an enterprise—it cannot be driven into it. Our problem, then, is reduced to the task of assembling, without economic detriment, the utility blocks of a puzzle picture, labeled "best possible or maximum service," "honest minimum investment," "lowest rates," "fair compensating profits."

Regional integration is logical

We have at present two ways of producing electricity —by water power and by fuel consumption. Maximum service and minimum investment cannot prevail in any given state through an independent or detached production of electricity by either steam or water power. It can come only through a judiciously co-ordinated and interconnected system of both kinds of plants, the location of which and the relative number of which depend mainly on the characteristics of watersheds, the density and diversity of electric load, the cost of fuel and its proximity to the load, the availability of condensing water, and the length of transmission lines from power sites to load centers. An economic co-ordination takes into account original costs of construction and costs of operation. Our national welfare and happiness demand that the development and progress of the electric service take place along broad and all-embracing lines. The system nearest to perfection must of necessity embrace more than one state or even two states. It will comprise several states forming a group. The fewer the groups of states that go to make up national systems, the greater will be our welfare and happiness; the lesser the rates will be to the consumer, large or small; the more compensating will be the profits to the producer. This complex co-ordination and conservation of natural resources, this close interconnection of systems, require not only a studious application of engineering principles with an economic control, but the whole plan must have governmental co-operation and support. Otherwise, confusion will result, dissatisfaction prevail and social disturbances menace the benefits and comforts derived from electric service.

Public in the dark about national phases

The power interests appreciate the merit and public value of this co-ordination of power and interconnection of systems and have made rapid strides along those lines both in a physical way and in their intercorporate relations. But their efforts in that direction have been kept from the public. At present the power companies rely principally on three methods to acquire and retain public good will: First, most companies establish local public relations departments in charge of local men who generally do a good job of creating a friendly public feeling for their company. When, however, some one raises the cry of "monopoly, financial colossus, outside control, etc.," the public relations men of the company retain their personal popularity as good fellows, but the confidence in their company is shaken. The people are reminded that these men are working for the company.

Second, writers fill magazines profusely with articles designed to combat the public utterances of those who assail the practice of electric companies. The articles are read by those who already believe in the good faith of the companies and by those whose belief that all power companies have sinister motives is unshakable. The public itself remains ignorant of the facts and continues to suspect. Third, radio speeches are delivered under the auspices of some interested banking house, and the radio listener shrugs his shoulders as if he had expected to hear exactly what is said. The argument has not "gone home." It is known that the power side of the controversy on rates and profits will be admirably presented. The public longs, however, for the disinterested and unbiased announcement of the facts. It will not make up its mind for just action without this actual knowledge.

Public scents a profit motive in interconnection

The power interests have assumed that the consumer would recognize the results in the shape of better service and in the occasional lowering of rates. Instead, the public finds it easier to believe that the consolidation of utility interests and their concentration of parentage have more for a motive huge profits for the investor than increased service at lower rates for the consumer. In some cases it is perhaps true. The American people have always resented being kept in the dark on matters concerning their welfare and happiness; men in public office have long since discovered this particular American trait; business men in public service must come to that realization.

How a given region with an existing and potential load as its economic center can be supplied with the maximum of electric service at lowest rates consistent with minimum investment and fair profits is a problem which can unquestionably be solved best by the industry's experts, but the public of the region in question is entitled to have the plans for such gigantic co-ordination of resources checked and approved by its representatives, and to have the honesty of investments, the reasonableness of rates and the adequacy of profits of so complex an economic structure viséd by its own agencies.

Federal regulation a logical consequence

Irrespective of what percentage of the electrical business is interstate, this job of governmental co-operation is probably beyond the power or ability of any one state or group of states to undertake. It involves regions of tremendous areas, and it must to a degree reconcile the conflicting interests of areas within a region and even those between the regions themselves.

This does not mean that each individual state, or compact of states, should be deprived of regulatory power within proper jurisdiction. It does mean that the exercise of state authority should be based on controlling facts developed by the regional plan found best adapted and most comprehensive for the economic power development of the region. This governmental co-operation can function most beneficially through a federal agency.

The public can be relied upon to settle this problem right. As Arthur Brisbane metaphorically said at Atlantic City this year, "Let there be light." The public utilities should pursue their individual and group studies of regional economic expansion in the open. Unity of leadership is needed, however, just as it was needed in the World War. General Pershing's initiative and enterprise as a soldier were not diminished one bit under the Allied leadership. On the contrary, those sterling qualities of that great American were given greater expression because of the conditions of comparison thus created. Private initiative and enterprise of the American utility engineer and financier would not suffer under federal co-operative leadership. In my opinion, added impetus would be given to private efforts because the public, being fully advised, would have confidence that the interests of the consumer are being protected, and the investor would feel that the industry has the support of the public. Under that kind of federal supervision—call it regulation if you will—within a reasonable time the United States could be divided into key regions for each of which a flexible initial plan could be developed for maximum service at minimum investment.

In any well conceived and managed electric system, as well as in any other business, for any given set of conditions within a region, there is a relatively constant ratio between initial costs, output, operating expenses and gross revenues. The extreme limits of this ratio are less widely separated for hydro-electric than for steam plants, but, in either case, or in combinations of both plants, these ratios can be reasonably and fairly determined for any region, or for a zone within the region if abnormal conditions so warrant.

Federal survey should be repeated

The Department of Commerce in 1924, under the direction of President Hoover, then Secretary of Commerce, undertook such studies for the northeastern part of the United States. These studies should be brought up to date and modified to meet the conditions arising since that time. The progress made in the science of steam engineering, the depressed prices of fuel, the shifting of centers of load density and its characteristics, the diversification of uses, not to speak of the promised developments in internal-combustion engines, the improved methods of transmission, all of these things make necessary a revision of estimates made in 1924. Besides, that study merely scratched the surface, as it was intended simply as a "contribution to the advancement of power development." The plan now proposed is a *bona fide* effort to furnish, through the government, legal, technical and economic co-operation, with administrative support, to private enterprise and individual initiative in the producing and marketing of electric current on the basis of best and sound uses of our natural resources of water and fuel, with fair profits to the investor and lowest costs to the consumer. The studies to be made must include a detailed and searching diagnosis of the problems confronting us, and the estimates developed must be so workable and reliable that not only will the confidence of the industry and of the states be gained, but the public demand and insistence that regulation of rates be controlled by the facts established will also be met.

From these studies indices of costs of delivering electric current at load centers can be worked out. Basic estimates can then be set up for zones within the region and for states within the zone, upon which reasonable costs of production and transmission of electricity and fair profits can be developed.

Costs of distribution and of marketing require much greater analysis and are largely affected by local con-

ditions. The work of the federal agency in the determination of the first costs, however, would be of immeasurable assistance to the state or municipality considering rates and profits of the local service. Standardization in some of the phases of electric distribution is desirable, and, moreover, impartial comparisons of the various forms and degrees of state and municipal taxes against electric service would enlighten the public as to the ultimate recipient of that part of its electric bill which represents taxes paid. It can then pass judgment upon the question: High taxes and high rates, lower taxes and lower rates, or high taxes with lower rates but less profit to the investor—which is of greater public benefit? Here, again, federal leadership and co-operation appears to be not only desirable but essential, since we shall soon deal with vast regional systems of interconnected transmission and distribution of electric service under intercorporate management.

Of course, no radical and sudden changes can take place. Due regard must be given to existing investments, rates and to present demands of consumers. The plan would be a goal to drive to as rapidly as other business and social conditions would permit.

The public will recognize that only by such co-ordination and interrelation of private interests can the consumer reap the fruits of the economic development of the electrical industry, and the investors must accept this scheme of federal approval of basic regional rates unless they desire to forego in the future the earned rewards of honest investments wisely managed.

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Crawler Cranes Solve Problem in Railroad Electrification

By T. J. SKILLMAN

Chief Engineer Pennsylvania Railroad Company

The erection of steel for substation, tower and miscellaneous purposes in railroad electrification work sometimes proves difficult for structures not sufficiently close to the main railroad tracks to permit handling by a locomotive crane. Here crawler cranes have proved their value in convenience and economies.

Many substations have an equipment track installed. If use of the locomotive crane is attempted here, shifting of the track to get close to the foundation on which the steel is to be placed must be undertaken. Two obstacles are encountered in this procedure: Other foundations would prevent the desired shift of the track, so that their construction must be delayed until the steel is erected, and many of the substations require a new fill of ground to bring the surface to the desired grade. The track on this newly filled earth will not support the derrick satisfactorily. This method is therefore unsuitable.

Where no equipment track exists in the substation, a gin pole and hoisting engine may be used to lift the steel into position. This plan requires the shifting of the pole from one location to another, with incidental danger of dropping it while moving it. While lifting the steel, it is a difficult task to keep the guy lines to the proper tension to prevent a shift of the gin pole with the possibility of dropping the load. This method has also been abandoned except in isolated cases.

A more satisfactory method, and that now used by the Pennsylvania Railroad, involves a crawler type crane with a boom suitable to the weight and height of the steel to be erected. The traveling element of the crane must be such that it can move over soft ground and turn in a small radius. At all times it is necessary to use planking for a track on which the crane can move. When the crane is located for lifting the steel it must be placed on heavy planking for proper support.

During the erection of the main steel towers of the substation the crane, with an operator, one foreman and nine steel workers, is employed. Two of these steel workers are used to bolt up erected steel, while the other men are engaged in the erection work. Of this erection gang, two men handle tag lines and the remainder land and secure the foot of the tower on the foundation.

To unload one steel tower from the substation siding, move into position and erect requires approximately 85 man-hours. The use of the crane for eight hours is necessary in this unloading and erecting. The man-hours given are average and will vary somewhat with local conditions.

The high trusses in the substation structure cannot be lifted into place with the boom of the crane. Short wooden masts are erected on each tower, so racked as to overhang the truss to be lifted. On these masts are rigged blocks through which pass the fall lines from the load to the drum on the crane. By this means the load is lifted into position by the crane.

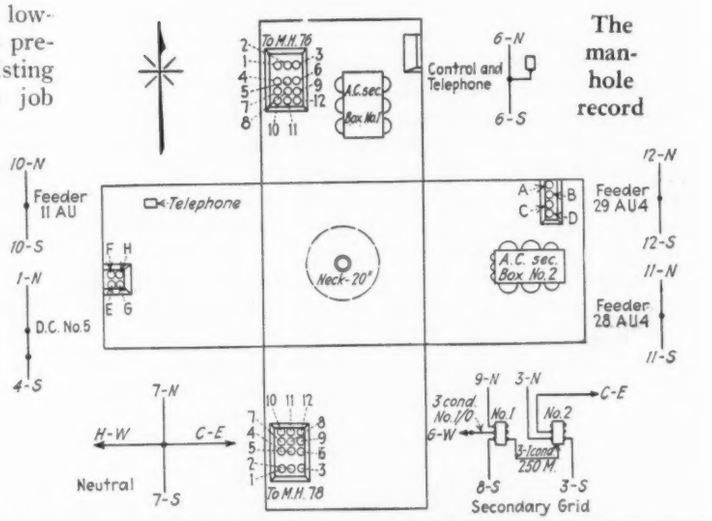
Crawler cranes simplify construction problem at Hackensack substation

Underground Planning Records

By CARL W. EVANS
Underground Distribution Engineer
San Antonio Public Service Company, San Antonio, Tex.

THE conversion of the underground system of the San Antonio Public Service Company into a low-voltage, alternating-current network in 1928 presented the opportunity to revise completely the existing underground records. Careful planning of this job resulted in a minimum of data duplication, a record that can be maintained easily and at little expense and from which a maximum of usefulness may be obtained. The planning records are divided into two general groups. One of these includes one-line diagrams of the various circuits involved. Each diagram covers only those circuits which are related and are usually studied as a unit. For example, on one sheet is shown the route, the cable size, the transformer bank locations and capacities, referring to one primary feeder. Similarly, another diagram shows the entire secondary grid. This general group of circuit diagrams includes the following:

1. Master feeder map showing all feeders.
2. Individual feeder circuits.
3. Secondary grid.
4. Underground telephone, signal and control cable circuit.
5. Direct-current 550-volt power circuits and services.
6. Street railway feeders.
7. Street railway negative returns.



The manhole record

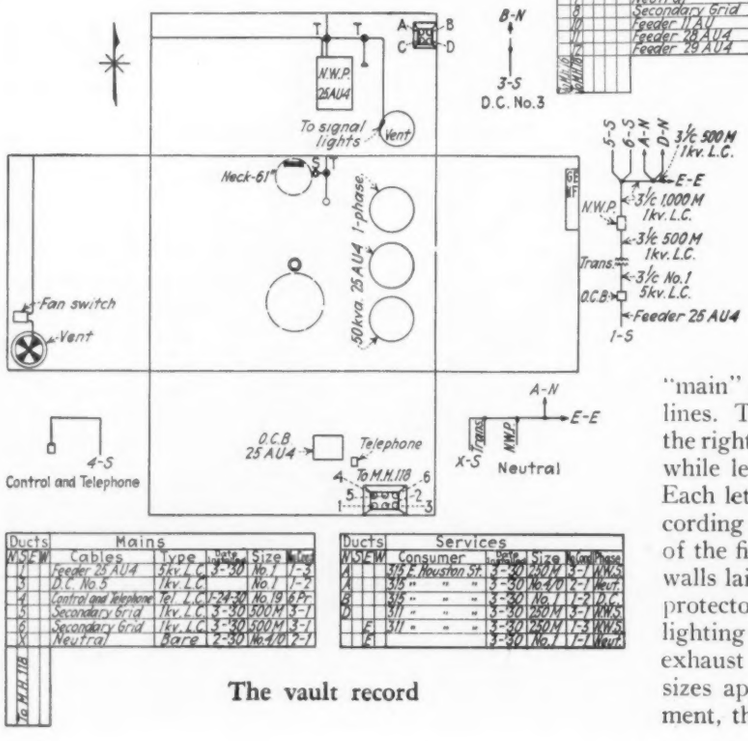
Ducts W S E W	Mains Cables	Type	Date	Size	Wire
1	D.C. No.5	1kv. L.C.	9-30	250M	1-2
2	Secondary Grid	1kv. L.C.		250M	1-3
3	Control and Telephone	Tel. L.C.	'29	No.19	6P-F
6	Neutral	1kv. L.C.		500M	1-1
9	Secondary Grid	1kv. L.C.		250M	1-3
10	Feeder 11 AU	11kv. L.C.	'29	No.4/0	1-3
11	Feeder 28 AU4	5kv. L.C.		No.4/0	1-3
12	Feeder 29 AU4	5kv. L.C.		No.4/0	1-3
3	Secondary Grid	1kv. L.C.		250M	1-3
4	D.C. No.5	1kv. L.C.		500M	1-1
6	Control and Telephone	Tel. L.C.	'29	No.19	6P-F
9	Neutral	1kv. L.C.		250M	1-1
10	Secondary Grid	1kv. L.C.		250M	1-3
11	Feeder 11 AU	11kv. L.C.	'29	No.4/0	1-3
12	Feeder 28 AU4	5kv. L.C.		No.4/0	1-3
	Feeder 29 AU4	5kv. L.C.		No.4/0	1-3

Ducts W S E W	Services Consumer	Date	Size	Wire	Phase
C	128 Soledad St.		250M	1-3	3
C	128 Soledad St.		No.1	1-1	Neut.
D	124 Soledad St.				
G	121 Soledad St.		No.1/0	1-3	3
W	121 Soledad St.		No.4/0	1-1	Neut.

8. Street-lighting circuits—station to first lamps.
9. Manholes and vaults—center-to-center distances.
10. Actual duct lengths.

No details of connections are shown in the one-line diagrams. These are easily found by referring to the proper record sheets in the second general group of planning records. This group consists of a series of manhole and vault records giving a considerable amount of detail information. Examples of these records are shown here.

In the vault diagram it will be observed that the tabulation at the left refers to all cables in "main" duct lines as distinguished from "service" duct lines. These latter lines are recorded in the tabulation at the right. Numbers are used to identify all main duct lines, while letters were chosen to represent the service ducts. Each letter or number is followed by N, S, E or W, according to the wall through which it enters. In the center of the figure is a scaled outline of the vault with the four walls laid back. All major equipment, including network protector, transformers, oil circuit breakers, marine lighting fixtures and conduit, telephone terminal box and exhaust fan, are shown in their exact locations and in sizes approximately to scale. In addition to the equipment, there is also shown the outlines of all the various



Ducts W S E W	Mains Cables	Type	Date	Size	Wire
1	Feeder 25AU4	5kv. L.C.	3-30	No.1	1-3
3	D.C. No.5	1kv. L.C.		No.1	1-2
4	Control and Telephone	Tel. L.C.	24-30	No.19	6P-F
5	Secondary Grid	1kv. L.C.	3-30	500M	3-1
6	Secondary Grid	1kv. L.C.	3-30	500M	3-1
6	Neutral	Bare	2-30	No.4/0	1-1

Ducts W S E W	Services Consumer	Date	Size	Wire	Phase
A	3/5 E. Houston St.	3-30	250M	3-1	W.W.S.
A	3/5 " " "	3-30	No.4/0	1-1	Neut.
B	3/5 " " "	3-30	No.1	1-1	Neut.
D	3/1 " " "	3-30	250M	3-1	W.W.S.
E	3/1 " " "	3-30	250M	1-3	W.W.S.
E		3-30	No.1	1-1	Neut.

The vault record

openings, the large ring and cover, the small entrance ring and cover, the ventilator openings and the sump location. The device shown within the small entrance is an iron ladder with which each vault is equipped. Within this same ring is given the "neck" length of the small entrance which may be used in developing profiles of the vault and duct system. These lengths are the distances measured from street level to vault ceiling.

Electrical connections within the vault are shown. For example, one is of the electrical connections from feeder 25AU4, which enters in duct 1-S, to the secondary main and service cables, leaving the vaults in ducts 5-S, 6-S, A-N, D-N and E-E. It may be observed that the size, type and rating of all cables between two splices are given in the diagram. The data on those entering ducts are easily obtained from the accompanying tabulations. Other one-line diagrams are given for those cables which have no direct relation to the network system cables. The neutral cables were included in this group.

From the data given in this record it is possible for a planning engineer to visualize almost every detail of the vault design and equipment. For example, if the present transformers were to be changed from 50-kva. units to 100-kva. units he could estimate the material required in the way of cable and splicing equipment to a very close degree, and all without a visit to the vault. On the other hand, if an additional bank were to be installed in the vault he could readily assign locations to the equipment without fear of blocking openings or encroaching upon cable training space.

This same record constitutes a life record of all cable in the main and service ducts, giving date installed, type size and number of conductors. In the figure the "type" data are limited to voltage rating and covering, because the main detailed information on these was not available at the time these records were prepared. In the future, however, insulation thickness, lead thickness, manufacturer and type of insulation will be given as well for all cable installed.

The other record sheet shown represents a manhole. The general layout of the record sheet is the same and the nomenclature of the one-line diagrams is also unchanged. From the diagrams the reader may deduct at a glance that feeders 29AU4 and 11AU are spliced "straight through" in this manhole.

In addition to these two general classifications of the planning records, the master one-line diagrams and the vault and manhole detail records, there is also maintained a large-scale record of all street lines and property lines. On this map are recorded all manhole and vault locations to scale, all service boxes, together with the rating of the service boxes in amperes. This record proves to be especially valuable when service ducts not in use are to be located. In such instances only a minimum amount of excavating is required.

The advantages of the set of planning records just described are obvious. The data are complete and the duplication of details is maintained at a minimum. For general planning and study of the system the one-line diagrams usually suffice, while for more detailed information the planner is referred to the vault and manhole records. In the few months that the system has been in operation the writer has had ample opportunity to judge their usefulness. So far all planning has been done without recourse to actual surveys and the results have been quite satisfactory. In one instance the plans for the installation of more than 5,000 ft. of secondary cable were prepared entirely from the records just described. These plans also included the exact cable-cutting lengths for each section and of those sections already spliced. It was reported that the cutting lengths were entirely satisfactory. It should be added that the plans referred to above give the cable splicer complete directions and diagrams of how the completed installation should appear.

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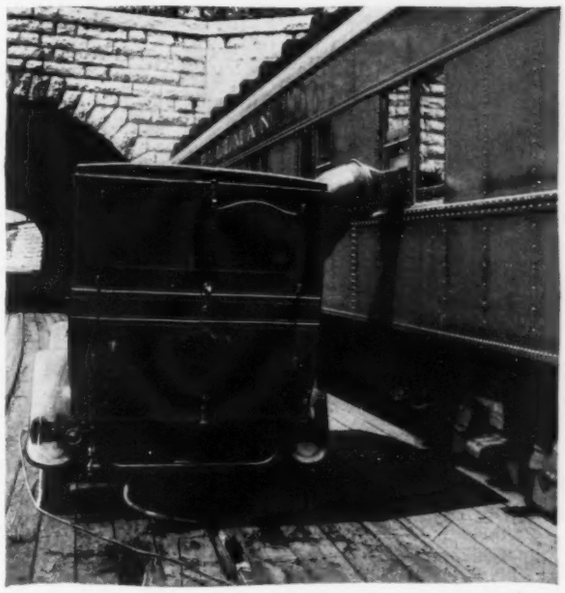
B. & O. Railroad Precools Its Pullman Sleepers



The Baltimore & Ohio Railroad in addition to installing electrical refrigeration and air-conditioning on two of its Washington-New York trains is using electrical power at several points on its system to cool off sun-heated Pullmans before their overnight runs start. A truck carries ice cakes and a fan driven by an electric motor served by extension cord from a platform outlet on the distribution system. The fan draws air across the ice and into a window in the Pullman corridor. The atmosphere in the car, heated by hours of standing in the yards is expelled through the roof ventilators and replaced by cooled air for the comfort of the sleeper patron who enters his berth before the train departs.

Air-conditioning on the Washington-New York day service is applied throughout coaches, diner, chair cars and observation car. Windows and doors are closed; the air is washed, cooled and dehumidified. Variable train speed, variable generator voltage and compressor motor torque requirements offered considerable obstacles to the development, but the equipment is now a commercial success. The operating cost adds less than 2 per cent to the car-mile costs of train operation. This venture presages a new adjunct of rail travel to meet competition by bus and plane. Incidentally it represents a new field of application of electrical facilities in energy conversion and control under pronounced technical difficulties.

Testing Breaker Insulation by Power-Factor Methods

Testimony from the field as to the usefulness of the power-factor method of testing circuit-breaker insulation was discussed at Harvard University recently under the auspices of the electrical apparatus committee of the New England Division of the N.E.L.A., F. D. Knight presiding. Frank C. Doble, president of the Doble Engineering Company, Medford Hillside, Mass., presented a paper reviewing the work done by his organization in testing about 14,000 bushings and analyzing circuit-breaker insulation conditions by the above method as applied to 11-kv. to 150-kv. equipment, and stressing the advantages of an alternating-current test as compared with direct-current procedure. The author contended that the method affords a new picture of the operating hazards possible in oil circuit breakers as well as a procedure for cure, where such is possible, by efficient servicing.

Manufacturing and operating engineers discussed the paper at length, following comment by Profs. C. L. Dawes and C. A. Adams of Harvard favorable to the accuracy and originality of the Doble method. Although the manufacturers' representatives were somewhat hesitant in their recognition of the method and loath to turn away from the "megger" as an established instrument of inquiry in this field, several operating engineers asserted that the Doble equipment represents a distinct addition to the resources of the arc and maintained that by this method information as to insulation conditions obtainable in no other known way can be had.

The Doble test measures watts loss and power factor in the insulation under investigation. The accompanying table gives the power-factor data from twelve field tests, the conclusions as to conditions found and check information obtained from service and power company opinion. The author contended that the limitations of the megger method in these cases prevented discovery of bad operating conditions until these were subjected to power-factor analysis. He asserted that the direct-current test is unable to reveal such hazards as the partial deterioration of the main insulation in a bushing or other insulating member, or to disclose surface leakage paths wholly external to the bushing (or other member) insulation.

Out of the insulation fault hazards uncovered in more than 14,000 tests, more than half had no connection with the main insulation of the bushing. Besides the leakage paths through the main insulation, several other leakage paths are capable of causing service interruption when abnormal. These include substandard oil condition, sludge, dirt, moisture, ice and faulty wooden cross-members, push rods, guide members and tank liners. The author maintained that the power-factor test will reveal these conditions and make it possible by reservicing to prevent interruptions. Of 3,715 bushings tested, 2.6 per cent were found faulty, and of these 1 per cent were bushing defects and 1.6 per cent external. In eight comparative laboratory tests of the accuracy of the Doble set against the Dawes bridge the averages were: Micro-amperes: Dawes, 684.7; Doble, 692; watts loss: Dawes, 0.1687; Doble, 0.170; power-factor in per cent: Dawes, 2.45; Doble, 2.45. The test apparatus is heavily shielded. In the field as many as 120 bushings have been tested in a ten-hour day.

Engineering comment diversified

C. A. Powel, Westinghouse Electric & Manufacturing Company, declared that the limitations of the watts loss and power-factor test do not establish it on the factory test plane, but after a bushing has been in service some time the loss and power-factor test makes a satisfactory maintenance check provided care is used in interpretation. The speaker contended that a relatively high loss reading does not necessarily indicate a defective bushing and that no sharp dividing line exists between good and bad bushings. The operator must judge for himself whether the advantages of this method of testing justify taking apparatus out of service for other than regular maintenance periods.

E. D. Eby, General Electric Company, said that tests at other than an operating voltage (e.g., at 10 kv.) do not necessarily yield results which would be secured under the actual operating potential. He believed that a high power factor does not necessarily indicate a poor bushing. Periodic inspection is the most desirable means of improving service reliability. Bushings deserve more attention. Wet insulation is the principal cause of service failures and indoor bushings rarely fail. Oil-filled bushings give little moisture trouble, but in solid-type bushings moisture absorption is a very serious matter on account of multiplied creepage paths. Comparative tests in the General Electric laboratories indicate that current readings are not indicative of conditions unless extremely bad. The company still believes that the high-voltage "Megger" offers the best method for testing solid bushings. It does not oppose the use of other instruments or methods which can show consistent results, and there are undoubtedly cases where the power-

Typical Faulty Oil-Circuit-Breaker Conditions Found in Field by Doble A.C. Test Set

Example	Type Breaker and Bushing	Power Factor as Found	Normal Power Factor	"Megger"	Final Test Conclusions	Proof
1	73 kv. solid	7.6	1.5	Inf.	Bad bushing	Punctured at 90 kv.
2	73 kv. solid	3.4	1.5	Inf.	Bad bushing	Punctured at 104 kv.
3	44 kv. oil filled	19.0	1.5	Inf.	Bad bushing	Water in bushing
4	15 kv. solid	38.0	3.0	Inf.	Sludge	Heavy sludge deposit found
5	37 kv. solid	5.4	1.5	Inf.	Ice or water in oil	Ice found in tank
6	37 kv. solid	22.0	2.0	Inf.	Bad wood member	Cross-member found charred
7	110 kv.-oil filled	19.0	1.5	Inf.	Ice or water in oil	6-gal. water found in tank
8	Condenser	....	1.5	Inf.	Bad operating condition	Caused outage later
9	37 kv. condenser	21.0	1.5	Inf.	Bad bushing	Power company agrees
10	150 kv. condenser	7.4	1.5	Inf.	Bad bushing	Arc. shield oil punctured at 7 kv.
11	150 kv. condenser	9.1	1.5	Inf.	Bad bushing	Moisture inside arc shield
12	132 kv. condenser	64.0	1.5	Inf.	Bad bushing	Heating of flange in main tank

factor test surpasses insulation resistance as a means of fault detection. In most cases the trouble is outside the bushing and the number small. R. M. Spurck questioned whether the Doble method is superior to the "Megger" or to visual inspection in fault location.

Prof. C. L. Dawes indorsed the alternating-current method of insulation testing and the accuracy of the author's method. Prof. C. A. Adams pointed out that the Doble tests disclose information otherwise unknown. He emphasized the flexibility of the apparatus, which can be used with the breaker switch closed, open, the oil dropped and other combinations.

E. S. Bundy, Buffalo, Niagara & Eastern, contended that it is impracticable to overhaul breakers after five or six operations, as suggested by the manufacturers. He cited the case of a 110-kv. breaker where the power-factor test spotted one bushing as bad. This was cleaned up, but owing to the need of getting the breaker back in service the other bushing in the same cell was not cleaned and the oil was left uncleaned. About a month later the second bushing failed, the first remaining intact. This example illustrated the value of the testing device.

C. T. Hughes, Connecticut Light & Power Company, said that it was decided in March to go through one series of Doble tests to see if their cost was warranted. All the 73-kv. bushings on the system were meggered, some 526 total. When no defects were found by the "Megger" the Doble test picked out some faults. Five bushings were found defective. Two in particular tested "bad" with the Doble method. These meggered infinitely, but when removed and brought into the laboratory both punctured, at 90 and 104 kv. Such voltages may be expected on an interconnected system at almost any time. The speaker said he felt that the expense of the test was justified in finding these two bushings, and the prevention of failure of other bushings (generally three when one goes) adds to the value of the test.

C. R. Reid, Shawinigan Water & Power Company, stressed the increasing importance of oil-circuit-breaker servicing, touching upon the danger from creepage or flashover on the part of the bushing immersed in oil. To reduce the frequency of servicing arc shields, the Doble test was applied with very satisfactory results. With one exception these showed a very low power factor and it was concluded that conditions were good. Tests on a number of 73-kv. compound-filled bushings which had begun to fail with startling frequency showed power factors markedly above the average in about 10 per cent of 50 to 75 bushings, and many with a power factor of about 2 per cent, which is normal. Within a few days one of the bushings which tested 6 per cent failed. The speaker declared his belief that the power-factor test affords a practical means of looking inside the breaker and locating the few which are different from the rest and so deserving of concentrated attention.

A. S. Walker, New England Power Association, testified that "Megger" readings had aided in reducing service failures in breakers, setting 100 megohms as the limit. Recently several bushings dropped to 8 or 12 megohms on semi-annual test, and the company believed it removed them just in time. The value of a method of securing an earlier notice of bushing deterioration is of much engineering interest.

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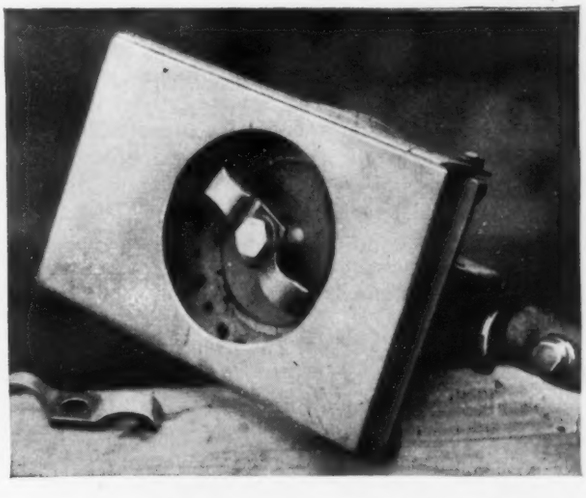
Pole Shaver Does Work of Four Men

Since the earliest use of poles the slow and expensive process of hand shaving has been the only means of removing the bark. For two years the Portland (Ore.) General Electric Company has been using a pole-shaving machine with entirely satisfactory results. With this air-operated tool one man can shave from eight to ten 50-ft. poles in one day, easily doing the work of four men. Moreover, machine work is superior to the work done by hand shaving.

Repairs are low and are confined almost entirely to making and sharpening of bits. Experience shows that frequent changing of bits is advisable, two changes being made for each pole. Full capacity of a 68-cu.ft. air compressor is needed to operate one tool.

Used like a carpenter's plane, this pole shaver quickly removes bark and knots



Guard side of shaving machine, showing cutter and indicating ease of changing bits

Realizing on the Insulation Value of Wooden Construction*

By J. A. JONES

Assistant Superintendent of Power
Carolina Power & Light Company, Raleigh, N. C.

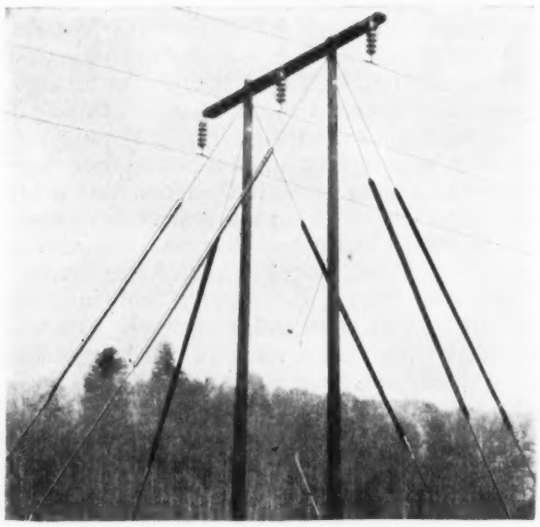
IT HAS long been known that many wooden-pole lines are relatively free from line interruptions due to flashover of insulators, although not always free from burned or shattered crossarms and poles. To prevent this damage the hardware has been bonded or tied together and a ground wire run down the pole and connected to earth. Lines equipped in this manner suffered fewer or no interruptions from burning, but in general the elimination of the insulation furnished by the wood resulted in increased flashovers due to lightning and birds.

In an attempt to make use of the insulation of wood and eliminate its disadvantages, a new type of construction has been employed. This construction is of particular interest as it may be applied to many existing pole lines as well as new construction.

A 66-kv. H-frame pole line 38 miles in length was constructed in western North Carolina from the Marshall hydro station to Spruce Pine. This line was constructed with an average span of 547 ft. of No. 1/0 copper conductor, four standard 10-in. cap-and-pin insulators in suspension and five dead-end, 22-ft. Washington fir crossarms for short and normal spans and 30-ft. Washington fir crossarms for long spans. All hardware was bonded and connected to a ground wire running down each pole. This line traverses some very rugged country and at several places attains an altitude of 3,800 ft. It was put into operation in the fall of 1927 and during 1928 there were slightly more than 90 interruptions suffered by customers receiving power transmitted over this line. All of the interruptions were of short duration as all insulators were able to withstand the power arcs; moreover, no damage to conductors was sustained.

1929 revamping decreases line interruptions

During the spring of 1929 all insulator strings on structures located at an altitude of 2,200 ft. or above had one insulator added to each string. There was also inserted in each guy one wood insulator $3\frac{1}{2}$x$3\frac{1}{2}$ in. x 20 ft. long equipped with suitable end fittings, leaving 18 ft. of clear wood. Each pole ground wire was cut, and into the gap a pair of horns made of standard $\frac{3}{4}$-in. galvanized conduit was inserted. These gaps have an arcing distance between tips of 7 ft. 2 in. and the tips are 3 ft. 6 in. from the pole, while the distance between the base of the horns along the pole is 20 ft. This gap provides a path for flashovers to prevent pole damage.



Pole-protecting horns and wood insulators

Marshall-Spruce Pine line of Carolina system has wooden construction which performs satisfactorily

It was considered unnecessary to provide protective gaps on the guy insulators, the pole gaps being relied on for their protection. If one or more guy insulators flash over and even separate, the line is seldom jeopardized, as there are usually enough guys left to support the structure. There were also installed 30 sets of V-S arcing horns at regular intervals along the line, with gap settings of 17 in. One set of four-fuse fused grading shields was installed at Spruce Pine substation. Two insulated overhead ground wires were placed over the Spruce Pine substation and back over the line for a distance of about $\frac{1}{2}$ mile and connected to station ground at the station end and permanently grounded at the other end. Installation of the above improvement was completed in July.

During the year 1929 the interruptions were reduced to 45, or a reduction of 50 per cent.

During the late winter and early spring of 1929-30 additional installations of V-S horns were installed as

**Abstract of paper presented before North Carolina Section of A.I.E.E.*

follows: Structure 1, right-hand conductor; structure 2, middle conductor; structure 3, left-hand conductor, etc., throughout the entire length of the line. This scheme gives one drain gap on each structure and is equivalent to a complete set on every third structure. Fused grading shields of the three-fuse type were installed at Marshall hydro station, Bald Creek, and Micaville substations at distances from Marshall of 21 and 28 miles respectively. Late in July an additional set was installed on the third structure from the Spruce Pine substation on account of the number of fuses being blown at this point.

Table I shows the number of blown fuses removed from the three phases of the line designated as *T, M* and *B*, reading from left to right when looking from Marshall.

There were also installed during July on structures 1 to 169 "Fiberloid" caps on the tips of the lower pole horns as indicators to determine whether the pole horns actually flashed over. These caps are made of inflammable material which is ignited when the gap flashes over, giving an indication that the gap has operated. To date six of these caps have been destroyed.

Interruptions for the year 1930 were reduced to eight. Four flashed insulators and six splintered guy insulators were changed, while five slightly splintered were not damaged enough to change. Not a single crossarm was splintered, nor was there any sign of pole splintering inside of the horn gaps.

In addition to the line just described, there is another line of similar construction, but double circuit, which should be considered. This line connects Asheville and Canton, with a tap to Enka in western North Carolina, and, like the Marshall-Spruce Pine line, is 66 kv. It was constructed with H-frame wooden poles, 6x8 in. x 25-ft., 30-ft. or 35-ft. crossarms, and carries two No. 4/0 copper circuits. All hardware is bonded and connected to ground through pole horn gaps. All insulator assemblies are protected with V-S horns and in all guys are installed 18-ft. wood guy insulators. The north circuit is known as the white circuit and is insulated with 11⅛-in.-diameter disk insulators, for in suspension and five in dead end. V-S horns on this circuit have gaps of 20½ in. The south circuit is known as the black circuit and is insulated with standard 10-in. disk insulators, five in suspension and six in dead end. V-S horns on this circuit have gap settings of 22½ in.

This line was put into operation in December, 1929, therefore operating experience covers an entire lightning season.

Four sets of fused grading shields were installed on each circuit prior to March 28, 1931, at the following points:

Location	Pole No.	Date
Enka sub. (black)	Pole 69	March 23, 1930
Enka sub. (white)	Pole 69	March 23, 1930
Canton Junction (black)	Pole 25	April 4, 1930
Enka Junction (black)	Pole 140	February 16, 1930
Elk Mt. plant (black)	Tower 176	February 16, 1930
Canton Junction (white)	Pole 25	March 28, 1930
Enka Junction (white)	Pole 133	February 15, 1930
Elk Mt. plant (white)	Tower 176	February 16, 1930

Owing to a section of the line near Canton, 2.91 miles, being of steel towers, there were fused grading shields installed on structure 25, this being the first wood structure. This installation was made to keep surges originating on the H-frame section of the line spilling over the insulators on the towers.

On July 18 and 20 three additional sets of fused

Table I—Blown Fuses Removed

Marshall			Bald Creek			Micaville			Pole 364 Spruce Pine			Pole 366 Spruce Pine		
T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
4	4	5	1	1	2	4	7	6	3	3	3	9	3	3
Total 13			Total 4			Total 17			Total 9			Total 15		

Total all installations 58.

Table II—Grading Shield Fuses Blown

Black Circuit

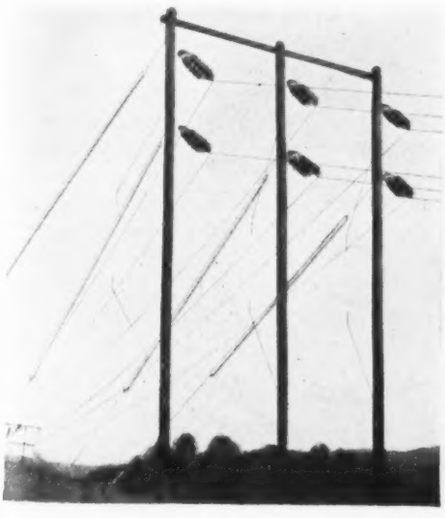
Canton			Pole 25			Pole 133			Pole 140			Elk Mt.			Enka Tap Pole 2			Enka sub		
T	M	B	T	M	B	T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
1	1		5	5	3				1			2						1		1
Total 2			Total 13						Total 1			Total 2						Total 2		

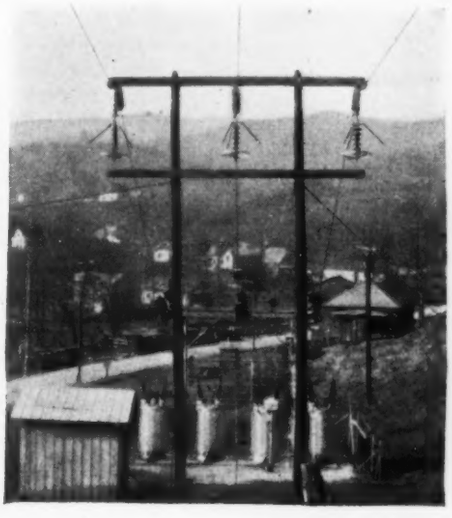
Total black circuit all installations 20.

White Circuit

Canton			Pole 25			Pole 133			Pole 140			Elk Mt.			Enka Tap Pole 2			Enka sub.		
T	M	B	T	M	B	T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
1			3	4	3	3	4	3				1	1					2	2	3
Total 1			Total 10			Total 10						Total 2						Total 7		

Total white circuit all installations 30. Total both circuits 50.





Left—Turning angle on double circuit

Right—Substation structure has fused grading shields

grading shields were installed on each circuit at the following locations:

Location	Pole No.	Date
Enka Junction (black)	Pole 2	July 20, 1930
Enka Junction (white)	Pole 2	July 20, 1930
Canton (black)	Tower 2	July 20, 1930
Enka Junction (black)	Pole 133	July 18, 1930
Canton (white)	Tower 2	July 20, 1930
Enka Junction (white)	Pole 140	July 18, 1930

Twenty blown grading shield fuses were removed from the black line and 30 from the white line during the lightning season, as shown in Table II.

Five damaged guy insulators were found, as follows: one each on poles 47, 89, 97. These separated due to the intensity of the flashovers, therefore they were replaced. One each on poles 98, 99 were slightly damaged, but the units on the poles were allowed to remain in service.

"Fiberloid" caps were installed on the tips of all lower pole horns on August 1 and 2. All of these caps are intact, indicating the absence of flashovers since their installation.

Oil circuit breaker operations at both ends of the black circuit caused nine momentary circuit trip-outs, while operations at one end caused one. Oil circuit breaker operations at both ends of the white circuit caused two momentary trip-outs, while operations at one end caused six. Out of a total of ten trip-outs on the black circuit and eight on the white, there were seven on both circuits occurring simultaneously. None of these trip-outs occurred during July, the month in which the greatest number of fused grading shield fuses were blown on the Carolina system.

Fused grading shields have gaps of 12 in., 12½ in. and 13 in. per conductor. Spillway gaps are placed on the station side of grading shields with settings of from 15 to 16 in. for protection in the event that all of the grading shield fuses are blown before the storm is over.

A ground alarm accompanied by a three- or four-point dip in line voltage is an indication that a fuse has operated.

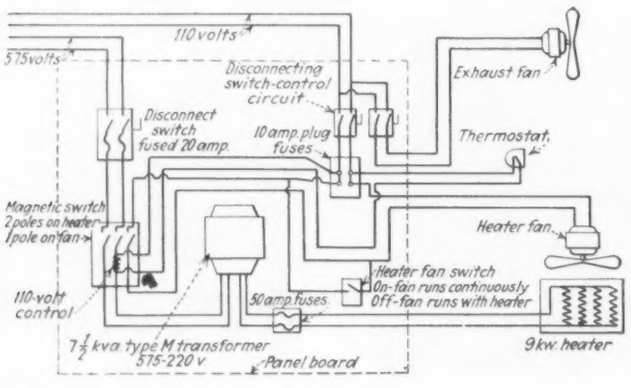
In conclusion, it might be stated that there are in operation at the present time on the Carolina system 257 miles of 66-kv. and 110-kv. transmission lines similar to the ones previously described.

Electric Air Heater Dries Varnish Rapidly

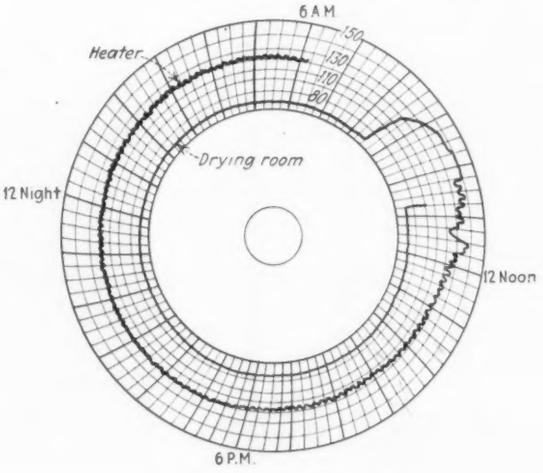
By utilizing a 9-kw. electric air heater with ventilating fans the George E. Sessions Company, Worcester, Mass., has cut down the time of drying varnish in casket manufacture from a former average of three days to twelve hours. Formerly all caskets were sprayed, dried and sanded in the same room, with resulting dusty conditions and low room temperatures at night. Following a conference with the industrial sales department of the Worcester Electric Light Company, a drying room 50 ft. long x 20 ft. wide x 10 ft. high was built of heavy wall board and with a double floor and double door, and provision was made to supply screened air through an American heater operated at 220 volts, single phase, with the aid of a motor-driven fan rated at 1,000 cu.ft. per minute and an 8-in. exhaust fan. The results have been highly satisfactory and the saving in drying time and by the elimination of rubbing and sanding on account of the maintenance of uniform drying conditions will pay for the cost of the installation in about four months. The average daily cost of electrical energy is $1.75.

The heater circuit is controlled by a "Mercoid" thermostat on the side wall of the drying room. This operates a magnetic switch in circuit with a 7.5-kva. transformer feeding the heater coils. A third pole is provided in this switch to serve the intake fan motor. To prevent burnouts of the heater coils with the fan stopped, the intake fan is operated by the circuit which energizes the holding-in coil of the magnetic switch controlling the supply of energy to the heater. A snap switch is provided to permit operating the fan independently when the heater switch is open. The exhaust fan is manually controlled. Room temperature is normally held within 5 deg. of 80 F., the entering air being raised to about 120 deg. by the electric heater. About 6 cycles of five-minute heating and shutdown periods per hour are run off in usual operation.

Drying room wiring insures fan operation whenever heater is in service



Automatic control of electrically heated air stabilizes temperature in drying varnish



Lighting Service Departments

Suggestions for increasing their effectiveness.

Commercial, technical and sales limitations, and programs necessary to be followed.

By J. C. FISHER*
Illuminating Engineer
Consolidated Gas, Electric Light & Power Company, Baltimore, Md.

LIGHTING service departments may be approached from three viewpoints—internal operating efficiency, commercial possibilities, and technical practice. To determine effectiveness we must have a unit of measure. What shall it be: Total kilowatts added, kilowatts added per man, total increased revenue, increased revenue per man, man-hours per kilowatts added, or something else? All five of these, and perhaps other factors, should be used as each throws important light on the department's effectiveness. However, when we try to compare two or more departments in different cities by these measures we find a situation to which, I believe, there is no practicable solution. We differ in our practice in counting or evaluating added load, in allocation of work, in determining expense, in calculating the man-hours. Even if we found it desirable to follow rules for uniform practice in these regards, much is left to personal interpretation and estimate. Therefore, if our departments do not rank as favorably as we would like in such statistics, it does not necessarily mean that we are less effective. On the other hand, such statistics, if carefully prepared, are very useful in giving us an approximate check. Thus each department head must be able to adapt what he learns from others and from his own experience to his peculiar local conditions to make his department just as effective as possible.

One essential is to make an analysis of operating methods and their results at frequent intervals and to change them with changing conditions. Statistical information kept as nearly as possible up to the minute is very desirable. However, it should not be overdone. After setting up your own statistical plan, it is well to keep a weekly check on some items, such as number of recommendations, number completed, kilowatts added, kilowatts recommended, number of trial installations, and a less frequent check on others, such as the analysis of what each individual has contributed.

Another question to settle is office organization and segregation of duties. It seems best to relieve the engineers of drafting work as far as possible, but to have the layout made and all contracts made by the same man. Each man should have a specialty, but should spend about one-third of his time in general practice to keep him broadminded and make it easier to shift specialization when necessary.

Among policies affecting man-hours per kilowatt are whether emphasis shall be on number of recommendations or number satisfactorily completed and whether or not wiring specifications shall accompany each lighting layout. The first problem can be settled best by trying both ways and watching results. Some may get better results by making as many recommendations as possible and presenting them well, and some may prefer fewer recommendations followed closely to completion. The policy of writing wiring specifications, I believe, has been generally but reluctantly adopted. Much time can be saved by including on the blueprint such specifications as grouping of outlets on circuits, switch control, location and size of panels and feeder size, as well as the location of outlets by dimensions, type, size and mounting height of lighting equipment. Then a printed sheet of standard specifications, with typed additions when necessary, may be attached.

Some write long reports to accompany recommendations and sometimes they are necessary, but even with standard paragraphs, the use of which is another debatable question, much stenographic time is consumed as well as engineers' time, and I wonder if they are read after all. Generally the blueprint, prepared as indicated, with manufacturer's equipment illustration sheets, and a short letter of transmittal are sufficient. There are exceptions, of course. By all means present the report personally, if possible.

Approaches to the market

The general subject of approach, direct mail, personal or otherwise, to all lighting fields needs much study. For example, mailing material carefully prepared by experts for national use may be highly effective in one locality and fall flat in another. Why? I doubt if anybody really knows. It would seem, though, that experts could study the results of past efforts in different localities and derive some fairly reliable information about what kind of campaigns would be best under various conditions and whether national campaigns taken *in toto* locally are practicable. Some call mail campaigns useless, others affirm the opposite. Perhaps some time we shall have real evidence to show the proper places of mail and personal contact, and perhaps they will not have the same places in different localities.

**Presented at the third annual illumination conference, Westinghouse Lighting Institute, New York.*

The work of the co-ordination committee on lighting promotion activities last year, resulting in the pamphlet "Educational Engineering and Promotional Literature Available for the Lighting Industry," was a great step in the right direction. However, if this work is not kept up year after year, such a report will be out of date soon after its publication. Those who prepared campaigns have often seemed to overlook the fact that a power company's advertising program and budget are generally pretty well determined about January 1, and announcement in March of an attractive campaign to be run in April or May is likely to meet a discouraging reception.

In the field of residence lighting it seems to me our chief stumbling block is the lack of moderately priced artistic luminaires which meet proper illumination requirements. All three of these characteristics must be present to a satisfactory degree. This is too big a subject to discuss here, but I do believe that a design contest, followed by co-operation between central stations and manufacturers, could bring about the desired result. I wonder, too, if we would not profit by a meeting of minds of lighting engineers and interior decorators in determining the right way or ways to light different rooms.

What a field we would have in relighting offices if we could solve the composite problem of the landlord furnishing the lighting with the rent, the apathy and ignorance of the tenants in regard to lighting, and inadequate wiring. You cannot approach the tenant without antagonizing the landlord; you cannot "sell" the landlord because the tenant doesn't demand it, and even if you do, the wiring proves to be inadequate and the cost of change is prohibitive. This is a hard nut to crack, but the N.E.L.A. minimum specification for adequate wiring of lighting circuits in commercial and public structures, the S.E.D. Franklin "Red Seal" specification for good lighting, the Building Owners and Managers' Association committee reports, national advertising, etc., are helping.

If signs could be made to look better at reasonable cost and could be properly maintained, much of the opposition to them would disappear. The maintenance problem is a weighty and unsolved one. If you doubt its revenue-producing importance, make a survey of a portion of the signs in your city and count the percentage of the connected load which is not burning.

Technical aspects of lighting

In our lighting service work we have at least two purposes: (1) To increase connected load and consumption of electric energy and (2) to render a service which benefits mankind and which, therefore, builds good will. The second is more altruistic and probably would not exist were it not for the first, but it in turn indirectly helps to increase load and consumption. The service function cannot be fulfilled unless the load building is done carefully, correctly and judiciously. A mere drive for load may prove a boomerang unless each installation is correctly engineered. I say "correctly," rather than "carefully," because no matter how careful we are, a lack of experience may cause us to make a mistake which will return to smite us. So in justice to our customers, our companies and ourselves, we must use every available means for keeping our technical practice equal to the best. This does not mean to do less commercially, for our executives can measure our results only in increased load and consumption. The rest has to be taken mostly on faith, with an occasional concrete case, but it represents probably more than half the total value of our work.

In the lighting field we find men and women of all degrees of training and experience. Most of us received no college or university training in illumination and have had to get it in the hard school of experience, supplemented by short courses and conferences conducted by the lamp manufacturers and by reading. The papers and discussions at the educational session of the last I.E.S. convention, published in the last issue of the *Transactions,* discloses how various people feel about the problem, but all concur in the opinion that if the profession of illuminating engineering is to take its proper place in the scheme of things a better trained personnel is necessary. The problem is to provide the supplementary training needed by the men already in the field, as well as the feeding in of new men with adequate preparation.

There are difficulties in the way of any program, the main one being the doubt in the minds of those who could give us the necessary instruction as to whether we really want it badly enough. It will take time and money to provide such instruction, but if we make a loud enough and definite enough outcry it will be answered. The lighting institute courses and the I.E.S. architectural courses have helped tremendously, but not enough. There are still many gaps to be filled.

A positive educational program

I submit that the most practicable program is to have prepared a complete, detailed outline of what an illuminating engineer should know. This should be done under I.E.S. auspices by a committee representing (not necessarily including) lighting service engineers, general consulting engineers, architects, interior decorators, lamp and equipment manufacturers, laboratory technicians, physiologists, psychologists, physicists and electrical contractors. Next, the same or another committee should scan the educational field and determine where each subject or subdivision of a subject could be treated. In some cases there would be two or more methods of teaching with varying degrees of merit. For example, a subject might be assigned a definite number of hours of university instruction, but might be covered with reasonable practical adequacy by a shorter lighting institute course. Lighting institute courses might be arranged in sequence, taking up different subjects each year. Where the committee could arrange for no adequate and practicable coverage of a subject for both practical workers and students, it would recommend that a correspondence course be prepared for that subject, and in fact correspondence courses might be options for the other subjects. Thus we would have a comprehensive co-ordinated picture of what an illuminating engineer should know with a practical method of obtaining the knowledge suited to all who need it.

As a small but important step in this direction the I.E.S. lighting service committee has started and operated successfully for one year an exchange of data on successful outstanding or unusual lighting installations. The result is what we call "Lighting Data Sheets," each consisting essentially of a photograph, a floor plan or layout and brief but complete technical information. The activity is founded on the hypothesis that lighting practice is being developed in the field by lighting service engi-

neers, private consulting engineers and architects, and that when an installation having unusual features or merit as a criterion is achieved it will help everybody else to know all the details about it.

There are three essentials to the plan: (1) Field engineers must be willing voluntarily to submit data; (2) the selection must be made by a committee to keep a fair balance between classes of installations and manufacturers and to maintain a high standard, and (3) the activity must be financially supported by subscriptions of $1 for the series of 48 sheets. A sliding scale of prices applies to a large number of subscriptions from one source.

Another technical aid is a segregated file of published lighting articles. A method used successfully in our office is to mark each article to be preserved with a classification number obtained from the index to Lighting Data Sheets, then circulate the magazine around the department and, finally, have a designated individual remove the article from the magazine and file it in a grip file under the proper class number (a separate grip file for each number).

It is very desirable to provide each engineer with a compact pocket book of information for lighting layouts and sales data. Some manufacturers are maintaining such data books for engneers and some central-station companies are also. The main trouble with all I have seen is that they have too many pages. They could be smaller and, therefore, more valuable because easier to handle if only essential information were included and waste space eliminated.

Conferences are valuable

Conferences of lighting engineers held at the various lighting institutes are opportunities not to be missed to keep pace with developments. At least one member of each lighting service department should attend such a conference at least once each year. The program should give all the new developments in complete truthfulness and new equipment should be exhibited. The selection of the conference or convention to attend will depend partly on geographical location and partly on which program seems to fit the individual's needs best. Generally with the programs as they have been arranged it is desirable, if not necessary, to attend at least two conferences or conventions yearly.

Manufacturers could help us greatly if they could find a way to supply us with more complete, up-to-date information on all their equipment information of the kind and in the form we need. Further assistance could be rendered if they would have their field men call with a full exhibit of new material at least once a year on all the larger lighting departments and arrange a nearby centrally located exhibit for the smaller ones. The call should be arranged beforehand so that not only all the department members, but others interested, could be assembled at one time and place. The practice frequently employed of having an official of the company drop in on a lighting department for an unannounced call is seldom a good arrangement for either side.

I have noticed from time to time the false impression created by reports of photometric tests of equipment. The test may be true enough within the limitations of the method, but there are several ways of making a unit appear at its best and better than would be obtained in practice. Worse still, there are units offered for sale without tests—oftentimes inferior units for which extravagant claims are made. Lighting service engineers may wield a great power and owe the customers of their companies a distinct obligation to be able to furnish them correct, impartial advice in the selection of equipment. We incur the enmity of the manufacturer if we arbitrarily take sides or if we call one test better than another unless there is an authoritative standard test which can be applied to all equipment in a given class.

Now, it is possible to get comparable results, but the tests are more expensive than by the old methods and manufacturers are reluctant to have them made unless they see evidence of a desire on our part to have and to use them. Such tests are the only basis I know of for acceptance specifications for lighting equipment. You can now set limits to be met by equipment as shown by tests in accordance with these standard methods. You may have for yourself and for presentation to architects impartial, comparative data to aid in the selection of equipment. Some such tests are now available, but all equipment will not be so tested unless and until we lighting service engineers representing buying and specifying power demand it.

For the sake of our customers, our companies, ourselves and our profession, let us use every means at our command to maintain the highest possible technical standard for our work at the same time that we strive to boost our commercial efficiency. Let us keep in mind the proper balance between and limitations of local and national activity and, when the latter is needed, let us promote it wholeheartedly.

▼

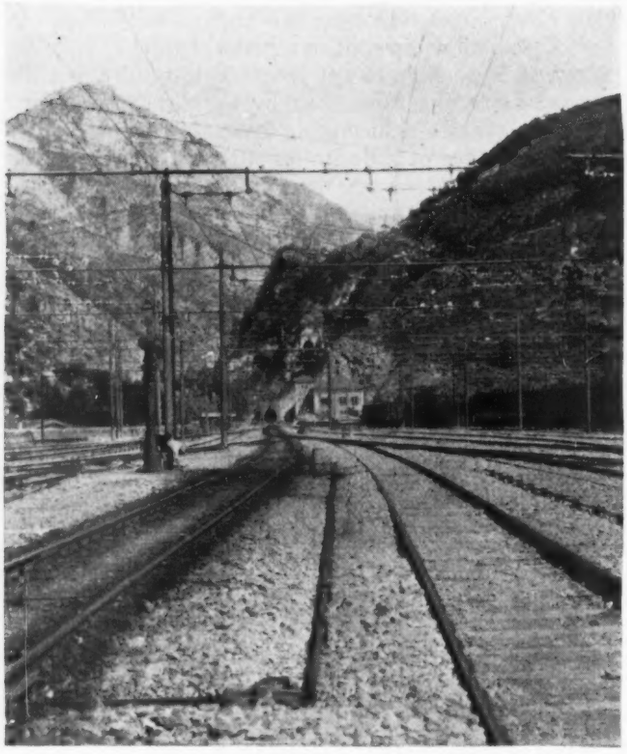
California Investigates Wood Destroyers

The Termite Investigations Committee, an organization sponsored by leading California producers and users of lumber with the co-operation of the University of California, has just concluded its three-year survey of termites and of methods of preventing or controlling the millions of dollars' annual damage done by them, according to an announcement by Prof. S. F. Light of the University of California department of zoology.

From an economic point of view the most important conclusions of the committee are as follows: The types of termites found in California are all native to the state. They have always been there and will continue there. There is apparently no feasible way of eliminating them completely, or even of reducing their numbers below a point of economic significance. But by the intelligent application of information which this investigation has made available, there is little excuse for any extensive damage in either new or old construction. Effective control is essentially a matter of proper building construction methods.

While the details of the problem have not all been worked out, the groundwork has been laid and a basis has been established for effective control. A relatively complete picture of California termite fauna has been obtained, including distribution of species, density of species, economic significance of species, biological factors upon which control measures depend, and chemical control measures.

Italy's Big Railway Electrification, 381 Miles Within a Year



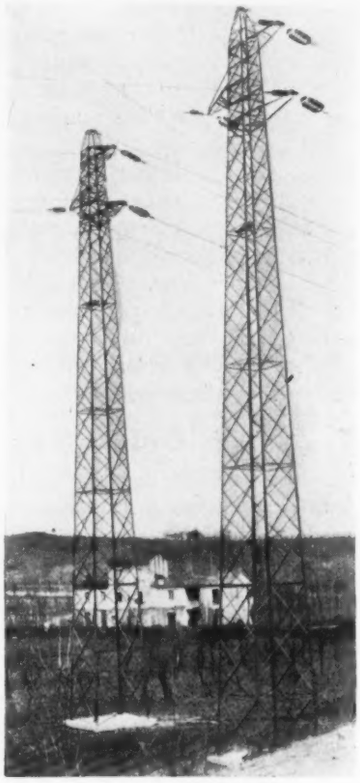
At St. Dalmazzo station on the Cuneo-Ventimiglia line

Three-phase operation uses double overhead wires and track as conductors. An Italian railway picture would be incomplete without a tunnel. Entrance near center of view.

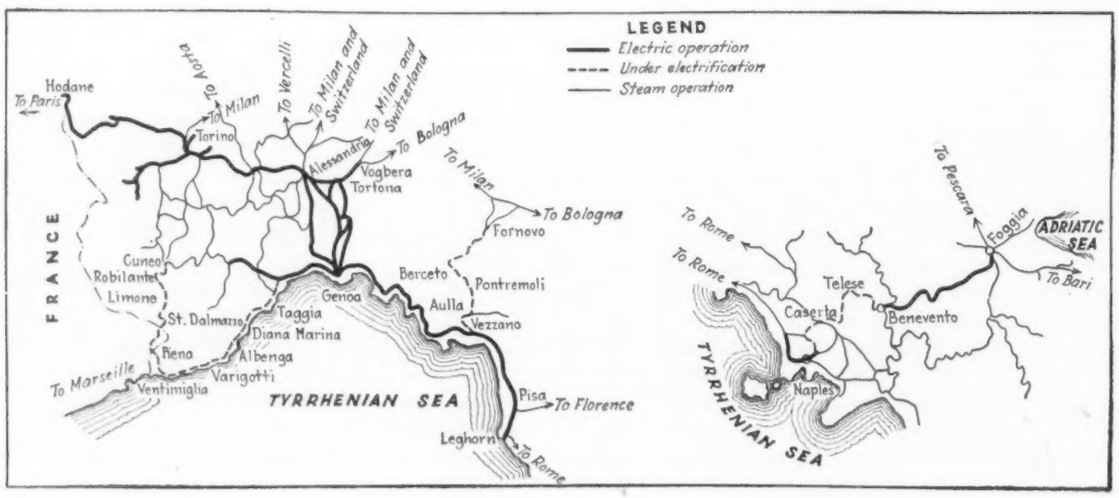
LACK of fuel, abundance of water power, mountainous country with heavy grades, sharp curves and extensive tunnels, together with considerations of the comfort of travelers in regions noted for their scenery, all contribute to make electric motive power the desirable form for Italian railways. Electric operation has been employed in Italy for many years and is of considerable extent, particularly in the northern part of the country.

Four additional lines are now being changed to electric traction. Three of these are in the north. They have the following features in common: High-tension supply at 60,000 volts; railway supply, through substations, at 4,000 volts, three-phase, $16\frac{2}{3}$ cycles. For the line in southern Italy running out from Naples direct current is to be employed. Operation will be at 3,000 volts.

1. The Cuneo-Ventimiglia line, which connects the Tyrrhenian seacoast with the Italian, French, Swiss and German back country to the north, is 61.7 miles long, 27.2 miles of it in tunnels. The ruling gradient is 2.6 per cent. The six 60,000/4,000-volt substations will have an aggregate transformer rating of 27,000 kva.



60-kv. line serving Spezia-Fornova line



Electrified railways in northern Italy

Densely populated, industrially and commercially important, this area is trending toward complete main-line electrification.

Viaduct on Cuneo-Ventimiglia line near Vernante

2. The Savona-Ventimiglia line, a continuation of the previously electrified Genoa-Savona line, follows the seacoast southwest of Genoa. Heavy traffic (especially by passenger trains), tunnels, single-track operation and scenic considerations favor the change. The length of line is 67 miles, 11.9 miles of which is in tunnel. Total electrified track is reported to be 106 miles; ruling gradient 0.6 per cent. Four substations have a combined rating of 16,000 kva. Two others are used jointly with other lines at the ends.

3. The Spezia-Fornovo line, 60 miles, carries much of the passenger traffic between Rome and Milan. It has 48.5 miles of single track (8.35 miles in tunnel) and 11.5 miles of double track (6.9 miles in tunnel); total electrified track is 93 miles; ruling gradient 2.5 per cent. The aggregate rating of five substations is 20,000 kva.

4. The South Italian line, between Naples and Benevento, is 60 miles long, with 100 miles of track. The ruling grade is 1.6 per cent. Direct current is supplied through mercury rectifiers having a total rating of about 12,000 kw. These can carry a 50 per cent peak for two hours and a 200 per cent peak for five minutes. This form of supply has introduced a problem of regenerative braking on grades because the operation of the rectifiers is not reversible. Rheostats are therefore to be installed to absorb energy thus recovered, if in excess of the needs of other trains.

The two first-named lines are to be officially opened within the next few months; the last two early in 1932.

Concrete Mats Make Portable Floodlight Mountings

Portability was combined with ease and low cost of mounting floodlights on the new Southern California Edison building in Los Angeles by the use of circular concrete mats as illustrated. On building floodlighting jobs some latitude in position and arrangement of lights is necessary, and the concrete mountings not only make this possible where a flat roof section or ledge is available, but reduce installation expense to a minimum by eliminating bracket arrangements and costly roof mountings.

The concrete mats are 6 in. thick and 15 in. in diameter and heavy enough to provide a substantial base for the lights. Several feet of flexible armored cable is used between the light and the building outlet.

Simple and economical mounting of floodlights that permits ready adjustment after installation

Radio Interference Elimination a Co-operative Task*

By C. C. CAMPBELL and H. N. KALB

Pacific Gas & Electric Company, San Francisco, and San Joaquin Light & Power Corporation, Fresno, respectively

Electric utilities should investigate or co-operate in the investigation of causes of radio interference. Utilities can secure and hold the confidence and respect of the community by accepting the responsibility of either ascertaining that its circuits are not at fault or clearing the trouble.

Any interference-producing device connected to the electric power supply network, for which utilities cannot be held responsible and over which the utility has no control, feeds radio frequency disturbances over a considerable portion of the utilities' circuits. This is the responsibility of the appliance manufacturer and not that of the individual owner. In most cases the latter buys and operates such a device without knowledge of its causing interference.

The responsibility for improper or inadequate installations and for defective radio apparatus rests directly with the radio trade. The public's responsibility is to do business with a reputable radio dealer and co-operate with the interference investigator.

Co-operative investigations usually are conducted by a radio trade association. The radio trade association can take the part of a neutral and unbiased party, locate sources of interference, regardless of its source, and properly place the responsibility. Under such a plan the power company, of course, loses its identity in the matter, which may or may not be to its advantage. Co-operative investigations have been carried on successfully in some parts of California for the past three years (1928-1930).

Sources of interference may be divided into the following general groups:

Utilities.
- Electric power and light companies.
- Electric railway companies.
- Communication companies.

Industrial and domestic electrical apparatus.

Transmission lines, 30,000 volts and higher

1. *Brush Discharge from Conductor.*—This is not of major importance at present. It is due principally to roughness of the surface of the conductor.

2. *Suspension-Type Insulators.*—This is not of major importance at present. The discharge comes from the gap between the metal cap and porcelain, and around the pin at the point of contact with the cement.

The remedy is to provide sufficient clearance between cap and porcelain or fill the gap with a compound that will remain slightly plastic and will not crack. At the pin the metal should have no sharp edges or points and the cement should be smooth and even with the porcelain surface. Additional units can be used to keep the voltage across any unit below the critical interference voltage. If it is necessary to use corona shields, they should be placed so as not to allow a brush discharge to the porcelain.

3. *Bushings—Switch and Transformer.*—Oil-filled or compound-filled bushings should give no trouble except in the possible case of potential transformer bushings where a pin connection is sometimes made. This connection should be made more positive as the oxidation on the pin causes a discharge to take place. Bushings with air columns for conductor space may be lined with metal if a close contact is made between the metal lining and the porcelain. If the conductor can be made a part of the bushing, the hole may be filled with metal filings of non-magnetic material, or with oil. If the conductor is to be removable, a split brass sleeve will answer fairly well. Copper plating, if properly done, provides a very good result. Copper-wire screen may be used with good results provided it is well covered with an insulating varnish. In all cases the metal must at some point make good contact with the conductor. Bushings to be used in connection with bushing-type current transformers should have a copper-plated surface from the supporting flange to a point over the cement ring joining the lower part of the outer porcelain tube and the adjacent tube. This acts as a static shield.

4. *Pin-Type Insulators.*—There are several possible sources of radio interference involving pin-type insulators. A great amount of work has been done to develop a new insulator that will not produce interference, by metallic glaze, coating, etc. Inexpensive methods of treating insulators now in service would help the situation.

5. *Bond Wires and Hardware on Wood-Pole Construction.*—Bond wires should always be placed between double nuts and never next to the wood. Hardware should be so spaced as not to allow discharges, or it should be well bonded.

Distribution lines, 5,000 volts to 30,000 volts

1. *Hardware Discharges.*—These can be cared for by changes in construction standards which provide for either greater separation or proper bonding.

2. *Air Switches.*—Switches now in use can be bonded by the operating companies, and those being manufactured can be provided with proper bonds by the manufacturers. Where iron caps are cemented to the tops of insulators in the making of these switches, sufficient clearance should be allowed between the lower edge of the iron cap and the porcelain.

3. *Transformers.*—Interference from distribution transformers is due to several causes and is corrected in most cases by changes in design, such as bushings, windings, terminal blocks, etc., each type of trouble being somewhat peculiar to some location or climate. These troubles are being cared for on present installations by the operating companies, and the new products are being put out by the manufacturers according to specifications for the companies operating in the different localities.

4. *Fuses.*—Metal parts on fuses for this class of lines should be so placed that there will be no discharge from the metal to the porcelain, or between the different metallic parts. The fuse wire in this class of fuses is subject to what is sometimes called corrosion, and when this takes place discharge to the side of the fuse tube usually occurs. The only remedy for this trouble is to replace the fuse wire. This trouble does not seem to occur where the tube is filled with a non-conducting dust.

Lines under 5,000 volts

1. Interference from this source is comparatively slight and not so important as that from the higher-voltage lines. Poor connections are responsible for many of these cases, and loose fuses account for many complaints. Old-type demand meters cause considerable trouble, but there are comparatively few of them, they are easy to locate, and are being replaced very rapidly.

Industrial and Domestic Apparatus.—Radio interference from this class of apparatus may be divided into three types:

First, that coming from commutating apparatus.
Second, that coming from make-and-break contacts.
Third, that coming from high-frequency apparatus such as violet-ray sets, diathermics and X-rays.

1. Commutating apparatus can be corrected by the use of two series condensers across the brushes, with the center point grounded to the frame of the motor. In larger installations it may be necessary to install air core chokes in the leads.

2. The make-and-break interference may be corrected by shunting across the contacts a resistor and condenser in series and in severe cases by the use of air core chokes in the leads.

3. To suppress the interference from high-frequency apparatus of this type it is usually necessary to have the room in which it is used thoroughly shielded and a suitable filter inserted in the supply leads.

4. *General.*—It is possible to purchase filters to correct practically all the troubles under this heading. The proper selection may be obtained by either consulting a reputable dealer or writing direct to the manufacturer of these filters.

In most cases radio interference is conducted and radiated by the power supply system. The distance

*Excerpts from paper presented at A.I.E.E. Pacific Coast convention, Lake Tahoe, California, August 25-28, 1931.

conducted and radiated depends upon the power generating the spark, the width and resistance of the spark gap and the natural periods of oscillation of the power supply system and connected apparatus. The distance also depends upon the high-frequency impedance from line to ground. Transformers furnish a comparatively low impedance path to ground, and thus a line with few transformers will carry radio interference a greater distance.

Contrary to earlier beliefs, sources of interference cannot be located by means of triangulation. The directional property of a loop antenna can be made use of at points of line intersections or at taps. This sometimes enables the operator to determine the circuit causing the interference.

The attenuation of high-frequency currents along wires does not follow the law of radiated electromagnetic field at right angles to the wires. Owing to discontinuities of line constants and reflection of waves, there is a development of unequally spaced nodes and antinodes of intensity. The intensity is sometimes greater a mile from the source of trouble than near its immediate source. Changes in intensity of interference are caused by resonant points, variation of distance from wires, presence of metal structures near lines, reflection phenomena, ground wires, tap lines, right-angle corners, changes in line configuration, etc.

In locating interference the usual procedure is to use an intensity method. The effect of noise upon the human ear is not a straight-line function and the ear cannot be depended upon accurately. A close inspection of equipment and the use of low-frequency exploring apparatus at suspected points usually shows the source of trouble. An investigator learns to keep on the right track by noting changes taking place at various locations as he drives along the line.

Experience is an important advantage in favor of the interference investigator. He must have a maximum of patience and persistence in actually tracing sources of interference. He should also be a man capable of meeting and intelligently talking to the public.

In general, the most satisfactory method of overcoming interference is stopping it at its source. From the power company standpoint, good radio construction and maintenance of power lines are important in order to avoid creating new sources of interference, thus forestalling future complaints. If the source of interference cannot be corrected, filtering at the source or isolating sections of lines by low-pass filters may be the best possible solution. Preventing the spread of interference by filtering transmission and distribution lines may not be practical from an economical or operating standpoint. Further study of the application and design of filtering devices is needed as each individual case may require special consideration.

The interference from electric power supply systems is well in hand except for the troubles originating on high-voltage lines. Although filters on power lines have been suggested, their use is yet very questionable. Manufacturers have a great opportunity in the sale of radio noise-proof appliances and apparatus. The public can aid by insisting upon such appliances.

In congested areas radio trade interference associations have proved valuable to all concerned, while in the less thickly populated areas clearing interference is still left principally to the utilities. Increased broadcast coverage is very desirable to offset the natural noise level in many of the large areas now having low-field strengths, as new and additional noises will always be experienced. Continued co-operative effort on the part of all concerned is undoubtedly the best solution to this problem, which has come to be paramount to millions of people depending more and more on the radio for entertainment and education.

Most Troubles Originate from Non-Utility Sources

Year	Number Investigated by P. G. & E.	Per Cent Due to P. G. & E. Co.	Per Cent Due to Other Causes	Per Cent Cleared Themselves
1924	90	30.0	37.5	32.5
1925	469	45.0	33.0	22.0
1926	1,782	30.0	40.5	29.5
1927	2,384	31.8	47.7	20.5
1928	2,973	36.6	40.6	22.8
1929	3,479	50.0	33.1	16.9
1930	3,736	51.5	32.4	16.1
Total	14,913	42.2	37.7	20.1

Farmers Need Facilities for Purchasing Electrical Equipment

THE need is urgent for the maintenance and increased establishment of depots where the farmers can purchase electrical equipment at reasonable prices on credit terms and can get these equipments serviced when necessary.

In the small market town practically the only agency for this duty is the electric utility, and its elimination from the merchandising field in some states will tend greatly to slow up the electrification of the farms and certainly will cripple the most sincere efforts to bring this electrification about.

This fact has apparently been entirely overlooked in the present agitation to divorce the selling of electric appliances from the service of electricity and should be emphasized, because the farm population wields a tremendous power in the framing of our laws.

Too little effort has been made by power companies to show the relation that distribution costs bear to generating costs. This is a more important factor in rural service than in urban distribution.

Unless extra effort is put forth to show these costs in their proper proportion much harm will result. The power companies will be accused of extortion, and unless the matter is carefully handled ill-advised and ill-financed rural power districts will be organized and equipped with poor and dangerous material.

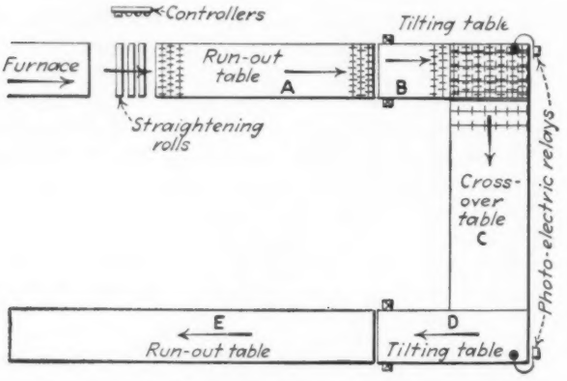
N. G. SYMONDS,
Commercial Vice-President
Westinghouse Electric & Manufacturing Company.

Photo-Electric Tubes as Limit Switches

By A. F. BOWERS
General Electric Company, Philadelphia, Pa.

Photo-electric relays are used as limit switches on the run-out tables from the annealing and normalizing furnaces at the new jobbing sheet mill of the Worth Steel Company, Claymont, Del. These run-out tables, on which patents have been applied for, differ in many ways from the usual construction. They were designed by the Worth Steel Company and built for it by the McCarter Iron Works, Norristown, Pa. The several tables in the train are synchronized and run at exactly the same speed to prevent slipping and resultant scratching of the sheets in the transfer from one table to the next. Because of space limitations, it was necessary to reverse the direction of the sheets through the mill. Once started, this equipment is entirely automatic.

After leaving the straightening rolls the sheet travels to the end of the tilting table (*B*), where it passes between a photo-electric relay and its light source. This relay stops the motors driving the rolls of the run-out table (*A*) and tilting tables (*B*) and (*D*) and starts the tilting motion. Tables (*B*) and (*D*) tilt until their rolls are below the level of the cross-over table rolls (*C*) and are stopped in this position by a limit switch. The sheet



Beam of light controls travel of sheet steel

now rests on the rolls of table (*C*) and is clear of the rolls of table (*B*). This same limit switch starts the roll motors of the cross-over table (*C*) and moves the sheet away from the area occupied by the intersection of tables (*B*) and (*C*).

Table (*C*) is long enough to accommodate two sheets between tables (*B*) and (*D*). Hence, before the equipment becomes automatic, two sheets must be placed on the cross-over table. The operator accomplishes this by turning out the light source for the photo-electric relays until the first two sheets reach the proper position.

Assuming that these two sheets have been properly located on the cross-over table between tilting tables (*B*) and (*D*), the transfer of the third sheet onto table (*C*) and the movement of table (*C*) sufficiently to clear the crossing of tables (*B*) and (*C*) places a sheet between the photo-electric relay located on table (*D*) and its light source. This relay stops the cross-over table motors and starts the tilting-table lift motor, bringing the rolls of the tilting tables to a position above the cross-over rolls. A limit switch stops the tilting tables in this position and starts the roll motors of tables (*A*), (*B*) and (*D*). The sheet on table (*D*) then runs out to the shears on table (*E*). Thereafter, when a new sheet enters table (*B*) the cycle repeats itself.

Photo-electric relays were used on this installation because the sheets that are rolled in this mill are too thin to operate mechanical limit switches.

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READERS' FORUM

Frowns on St. Lawrence Development

To the Editor of the ELECTRICAL WORLD:

I have just read with great interest the article by S. Burton Heath in the ELECTRICAL WORLD of July 25.

The case for the Maritime Provinces of Canada is not quite correctly stated. Mr. Heath says that "the Maritime Province of Nova Scotia has stood in opposition because of fear that canalization would interfere with the business of its chief seaport, Halifax." This is not correct. At present the two Canadian ports on the Atlantic seaboard, St. John and Halifax, are really winter ports, while the St. Lawrence is not navigable in winter, so that under present conditions the deepening of the St. Lawrence would not really affect either the Halifax or St. John port business. What the two provinces of New Brunswick and Nova Scotia claim is this—that if the St. Lawrence waterways are deepened, it will make navigation much better from Montreal west and will not improve navigation from Montreal east. Therefore, American coal from Lake Ontario and Lake Erie points will be sold cheaper in Montreal than it now is. The large bulk product that is sent from the Maritimes to central Canada is Sydney coal.

The Maritime Provinces further feel that they have assumed a heavy enough load in paying for existing canals in central Canada which are of no benefit to the Maritimes. Practically all the central Canadian canals are toll-free, and therefore the cost of operation is borne by the people of Canada as a whole.

There is also another point. The Canadian National Railway system is owned by the people of Canada. The Canadian Pacific Railway, a parallel line, is largely owned in Canada. Therefore, both these great railway systems have been constructed at the expense of the Canadian people. If the Canadian government undertakes to expend any large sums of money on the deepening of the St. Lawrence waterways, it is simply subsidizing traffic along that water route in competition with the two existing railway systems, which are now suffering from lack of traffic.

The deepening of the St. Lawrence waterways makes it quite possible that Canada would have to add to its national debt an amount equal to the entire national debt of this country before the Great War. These are among the reasons why so many Canadians are opposed to the deepening of the St. Lawrence waterways. There are others of a technical nature, but these economic considerations are most important.

E. A. SAUNDERS,
Secretary.

Halifax Board of Trade,
Halifax, Nova Scotia.

Men of the Industry

W. W. BARR, assistant to the vice-president in charge of sales of the Georgia Power Company, will take over the supervision of merchandise sales of the company September 1, succeeding H. A. Pendergraph, merchandise manager, resigned.

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EDWARD E. COUPLA, for the past five and a half years superintendent of the Pulaski district of the Niagara, Lockport & Ontario Power Company, has been transferred to the Oswego district. He will be succeeded by Amos Murtha of Rome, N. Y.

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OTHMAR K. MARTI, formerly chief engineer of the American Brown Boveri Company, Inc., is now associated with the Allis-Chalmers Manufacturing Company, Milwaukee, in the capacity of engineer in charge of rectifiers and railway equipment.

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WILLIAM H. LINES, vice-president of the Pacific Northwest Public Service Company and its subsidiary, the Portland General Electric Company, and for several years manager of the railway department, was appointed treasurer of both companies and given broader responsibilities in both.

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WILLIAM A. HEINDLE, Wilmington, Del., has been appointed a member of the Wilmington Public Utility Commission by Mayor Frank C. Sparks, to succeed Walter Brinton, whose term expired July 31. For a number of years Mr. Heindle was connected with the Wilmington & Philadelphia Traction Company. TIMOTHY J. MOONEY has resigned as a member of the commission.

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FRANK J. TONE, president of the Carborundum Company, Niagara Falls, has been chosen as the first winner of the Jacob F. Schoellkopf gold medal of the Western New York Section of the American Chemical Society. Outstanding contributions of Mr. Tone, as cited by the jury of award, include his work with the late F. A. J. Fitzgerald on the properties and commercial applications of silicon carbide, the production of pure metallic silicon and the industrial application of electrochemistry.

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TOM GRAY, district manager for the Public Service Company of Colorado at Alamosa, has been transferred to Fort Collins, where he becomes manager of the organization's entire northern Colorado district. He succeeds the late Lawrence W. Cody. H. Hugh Lenhart, new-business manager for the Public Service Company at Grand Junction, Colo., has taken over the duties formerly discharged by Mr. Gray at Alamosa. Mr. Lenhart, prior to his incumbency at Grand Junction, was affiliated with the Brazil Gas Company at Brazil, Ind., and Northern Indiana Gas & Electric Company at Hammond, Ind.

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A. A. Low Assumes New Executive Duties

A. AUGUSTUS LOW is now representing the Niagara-Hudson Power management at Utica as executive vice-president of the Utica Gas & Electric Company. Mr.

Low assumed his new duties in Utica on August 1. As president of the Old Forge Electric Company Mr. Low has been identified with public utility interests in central New York. He is also owner of the Horse Shoe Forestry Company and president of the Bog River Power Corporation, as well as a director of the *Adirondack Arrow*, a newspaper. As president of the Central Adirondack Association he has directed the development of that region as a vacation land. He has also furthered this work as a member of the Hamilton County Park Commission.

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T. H. MORGAN, formerly assistant professor of electrical engineering at Stanford University, has accepted the position of professor of electrical engineering at Worcester Polytechnic Institute.

MAX TOBY, for some time a member of the engineering department of the Pacific Electric Manufacturing Corporation, San Francisco, has been made advertising manager of the company. He succeeds RALPH WHALLEY, who has been assigned to sales work for the company in the San Francisco district.

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R. F. MEHL, superintendent of the division of physical metallurgy of the Naval Research Laboratory, has been appointed assistant director of research of the American Rolling Mill Company, Middletown, Ohio. He will be in charge of the physical science department of the Armco laboratories and will take up his new responsibilities September 1. He has been one of the research consultants for this company for the past eighteen months.

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WILLIAM F. JAMES, formerly Middle Atlantic district manager of the Westinghouse Electric & Manufacturing Company, has been appointed assistant to the commercial vice-president of the Atlantic division of that company. Mr. James entered the employ of the Westinghouse company in 1909, becoming engaged in industrial sales work in the Philadelphia office. In 1912 he began to specialize in steel-mill electrification and in 1923 became sales manager of the industrial division. In 1925 he was appointed Middle Atlantic district manager with headquarters in Philadelphia. Mr. James is a past-president of the Electrical Association of Philadelphia, past-president of the Engineers' Club of Philadelphia, a member of the industrial relations committee of the Philadelphia Chamber of Commerce and a member and past regional vice-president of the American Institute of Electrical Engineers.

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H. J. GILLE, since 1913 general sales manager of the Puget Sound Power & Light Company, with headquarters in Seattle, Wash., has been named manager of that company's agricultural-industrial division. Mr. Gille, who is at the present time vice-president of the State Chamber of Commerce and chairman of the land settlement committee, has lived in this territory for almost twenty years and through his activities as an official of this company and through his association with chambers of commerce and other organizations has become conversant with the needs and requirements of industry and agriculture in this territory. He has always taken a very active part in the affairs of the electrical industry, particularly the

Northwest Electric Light and Power Association, of which he is a past-president. He is also a member of the American Institute of Electrical Engineers and of the National Electric Light Association and a past-president of the Washington Manufacturers' Association. Prior to his taking up his residence in Seattle he had been sales manager from 1907 until 1913 in Minneapolis for the Minneapolis General Electric Company.

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RAY ARNDT has resigned as superintendent of the Central Illinois Electric & Gas Company, Rockford, to join the Consolidated Gas, Electric Light & Power Company of Baltimore in a similar capacity.

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ROBERT C. COFFY has been appointed manager of the eastern division of the Oklahoma Gas & Electric Company, with headquarters in Muskogee, to succeed the late W. H. Crutcher. Mr. Coffy has been associated with the Byllesby organization since 1908, when he joined the Oklahoma utility.

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O. M. JACKSON, commercial manager of the Macon division, Georgia Power Company, will on October 1 take the place of merchandise manager for the territory of that company outside of Atlanta, succeeding C. O. Brown, resigned. I. H. MOREHEAD is made merchandise manager of the Atlanta division.

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DR. EDWIN F. NORTHRUP, engineer and inventor, has been made the recipient of the Edward Goodrich Acheson medal for 1931 by unanimous vote of the board of directors of the Electrochemical Society. Since 1916 Dr. Northrup has devoted himself chiefly to the development of new methods of inductive heating. Earlier in his career he spent seven years—1903-1910—as secretary of the Leeds & Northrup Company, manufacturer of high-grade electrical instruments. From 1910 to 1920 he was assistant professor of physics at Princeton University. His technical studies were pursued at Amherst College, Cornell University and Johns Hopkins University.

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N. L. DINION, who has joined the U. S. Magnetic Products Corporation, Lock Haven, Pa., and has been elected executive vice-president, has been identified with the electrical industry for more than twenty years. He has conducted many laboratory tests for Charles R. Underhill and has designed solenoids and electromagnets for special and standard machinery. Recognized as an authority, Mr. Dinion has delivered several lectures on the subject of coil winding and solenoids and has added to many of the most recent developments in the coil industry, in addition to compiling valuable wire data. Some years ago Mr. Dinion was connected with the engineering staff of the Acme Wire Company. In 1923 he formed the Easton Coil Company, and until his recent resignation he served as president and general manager of that company.

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Frank Milhollan New President North Central Division

FRANK MILHOLLAN, who was recently elected president of the North Central Geographic Division of the National Electric Light Association, is president of the Central West Public Service Company, with headquarters in Omaha, Neb. Mr. Milhollan is widely known

in the public utility field. Previous to his association with the Omaha utility properties Mr. Milhollan was identified with the Board of Railroad Commissioners of North Dakota first as a member of the commission and then for seven years, 1921 to 1928, as president. He served on the executive committee of the Northwest Shippers' Advisory Board and of the National Association of Railroad and Utilities Commissioners.

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W. H. OSTERLE, division engineer for the West Penn Power Company with headquarters in Connellsville, Pa., has recently been transferred to the office of the chief engineer of the West Penn Electric Company at Pittsburgh, Pa.

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ROY J. WENSLEY, creator of the "televox," first of the popular mechanical robots, has been transferred from the East Pittsburgh engineering department of the Westinghouse Electric & Manufacturing Company to the meter department of the Newark works of the company. Mr. Wensley, who has been performing special duties in connection with Westinghouse refrigerator development, attracted international attention by the exhibition of his mechanical man. He has also done notable work in connection with switchboards and the designing of automatic switches and is a recognized authority in the field of intricate electrical control equipment. A native of Indianapolis, Mr. Wensley, a self-educated engineer, has been with the Westinghouse company since 1916. He has won much favorable recognition as the author of numerous technical articles for electrical journals and as a lecturer on engineering topics.

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OBITUARY

ELWIN C. FOSTER, formerly president of the Manchester (N. H.) Traction, Light & Power Company, died August 18 at Miami, Fla., at the age of 78. Mr. Foster was a native of Hancock, N. H., and for many years was active in the electric railway field, rising from a street-car conductor's position to the general managership of the Boston & Northern Street Railway. From 1912 to 1925 he headed the Manchester company during an important period of expansion in the property's affairs.

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GARDNER F. WELLS, for the past five years president of the Boston, Revere Beach & Lynn Railroad, shot himself August 21 at his office in Boston. Mr. Wells was 61 years of age, a native of Quincy, Mass., and a graduate of the Massachusetts Institute of Technology. A founder of the engineering firm of Hemphill & Wells, Mr. Wells in his capacity as consultant played a prominent part in the electrification of street railways in New England and in New York.

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JOHN J. ALBRIGHT, one of the pioneers associated with the development of Niagara Falls water power in New York and Canada, died at his home in Buffalo August 20 at the age of 83. For nearly 50 years Mr. Albright was prominently identified with the industrial and social life of Buffalo. He was born in Buchanan, Va., and spent his early years in Scranton, Pa. Following graduation from Rensselaer Polytechnic Institute at Troy, N. Y., he went into the coal business at Lewiston, Pa., and in 1883 he moved to Buffalo. Mr. Albright became president of the Marine National Bank of Buffalo and later a director of the Marine Trust Company and the Lackawanna Steel Company.

Financial and Statistical News

THIRD-QUARTER earnings are being discussed as a determining factor in business and the markets. Utilities will show earnings close to last year's figures, it is indicated. Many industrials have suffered during July and August, and at least a marginal decline from unexpectedly satisfactory second-quarter earnings is suggested by power consumption figures of the past two or three weeks.

——UTILITY AND OTHER STOCKS have continued to move in a narrow range during the week, with practically no change in indexes. The bond list has continued somewhat irregular but has not lost ground materially, despite unfavorable news from abroad and marked weakness in foreign bond issues, especially those of Great Britain and Argentina.

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Five-Million-Dollar Bond Issue Offered

FIRST-MORTGAGE gold bonds of the Interstate Power Company to the amount of $5,000,000 have been offered at 88 and interest, yielding more than 5.90 per cent. These securities, dated January 1, 1927, mature January 1, 1957. Of the present offering, $4,000,000 principal amount was originally sold by the company directly to the Utilities Power & Light Corporation, which in turn has sold the bonds, without profit to itself, to the present offering group.

The proceeds arising from the sale of the balance of the offering ($1,000,000) will be used to reimburse the company in part for extensions and additions made to the properties of the system and for other corporate purposes.

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Connecticut Subsidiaries of U. G. I. to Merge

PREFERRED STOCKHOLDERS of the Connecticut Light & Power Company will vote at a special meeting called for September 22 on a consolidation of properties involving $125,000,000. These properties are subsidiaries of the United Gas Improvement Company, and similar action has been taken by the Delaware and Pennsylvania subsidiaries of U. G. I., which have been merged to provide simplified capital and operating structures.

At the special meeting the preferred stockholders of the Connecticut Light & Power will vote on increasing the authorized capital and reducing the dividend rates on part of the preferred stock.

Additional stock will be issued to the Connecticut Electric Service Company to retire $5,000,000 of indebtedness of the Connecticut Light & Power to the parent company and to finance the acquisition of stocks of the Waterbury Gas Light Company, Winsted Gas Company and other utilities now directly owned by the Connecticut Electric Service, which are to be merged into the Connecticut Light & Power Company.

It is also proposed to make the dividend rate on all unissued preferred stock 5 per cent and to change the call price for the preferred stock from $120 to $110 a share. The company has issues of 7 per cent and 8 per cent preferred stock now outstanding.

Swiss Operations, 1930

SWISS WATER-POWER PLANTS at the end of 1930 comprised about 2,397,000 hp., according to the annual report of the Swiss Water Power Association. Including plants under construction, the total comes to 3,066,000 hp.

During 1930 central stations generated 3,690,000,000 kw.-hr. In addition plants of the Federal Railways produced 472,000,000 kw.-hr. and private plants about 1,300,000,000 kw.-hr. The total of 5,462,000,000 kw.-hr. was, it is estimated, distributed as follows:

	Millions of Kw.-Hr.
Light, heat and power	1,960
Railroad operation	704
Chemical, metallurgical, thermal, central power	480
Electrochemical and metallurgical, private plants	1,100
Miscellaneous uses, private plants	200
Export	1,018
Total	5,462

The corresponding total for 1929 is given as 5,398,000,000 kw.-hr. Thus there was a slight increase despite the industrial depression. The extensive electrification of railways and of industry makes the country rank high in per capita use, but the domestic consumption is only moderate. In the cities it averages between 300 and 500 kw.-hr. per household. It is growing with the increasing use of appliances as the population becomes more electrically minded.

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Foreign Exchange Affects American & Foreign Power

THE annual report and the March 31 financial statement of American & Foreign Power Company, Inc., reflect the effects of the world-wide business depression. This depression, according to the report, brought about, as to three of the countries served (Argentina, Brazil and China), a heavy depreciation in foreign exchange, when expressed in United States currency, and also prolonged the normal period necessary to secure and connect the new business necessary to earn the carrying charges incident to the large increase in generating capacity, transmission lines and other facilities placed in service during the last two years.

Operating revenues, expressed in United States currency, of the properties of subsidiaries controlled on December 31, 1930, showed a decrease for the twelve months ended that date of 2.8 per cent, as compared with operating revenues for the same properties for the twelve months ended December 31, 1929. Operating revenues and net revenues from operation (in the aggregate) in national currencies showed an increase. Included in the report is a tabulation in which the operating and net operating revenues of subsidiary companies by countries have been set forth comparatively, taking in one case the exchange at parity and in the other case the exchange at the average daily New York cable rate for the month.

It is stated that in Argentina, Brazil and China, where the most serious variations in exchange occurred, the flow of funds in the business of the company and subsidiaries during 1930 was to these countries; in other words, sums

greater in amount than the total net earnings of the properties in such countries were expended in the respective countries, principally for additions and improvements to the properties and payments on the purchase price of properties and in the liquidation of obligations payable in national currencies.

For the twelve months ended December 31, 1930, operating revenues of subsidiaries were $78,655,635, as compared with $63,709,207 for the twelve months ended December 31, 1929, while net revenues from operation of subsidiaries for the 1930 period were $39,719,983, as compared with $32,181,556 for the 1929 period. Earnings of properties are included in these figures only for the portions of the calendar years for which they were controlled.

The balance of the earnings of the company and subsidiaries applicable to interest charges of the company, after deduction of all expenses and taxes, retirement (depreciation) reserve appropriations and provision for minority interests, was $28,843,151. After the deduction of $3,738,273 for interest, the balance applicable to the company's stocks was $25,104,878. Dividends on the company's $7 preferred stock and $6 preferred stock were only $4,912,862, leaving a balance applicable to the company's second preferred stock, series A ($7), of $20,192,016. Accordingly dividends on the senior preferred stocks were earned more than five times.

The report for the twelve months ended March 31, 1931, shows a continued shrinkage in earnings, although the amount applicable to the senior preferred stocks was $24,248,698, while dividends on these senior preferred stocks called for only $5,288,963. The balance applicable to the company's second preferred stock, series A ($7), was $18,959,735, while dividends on this issue for the twelve-month period, whether paid or unpaid, called for $18,913,299, leaving a balance for common stock of $46,436.

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Johns-Manville Adopts Financing Plan

A DEFERRED-PAYMENT PLAN for customers ranging from the individual home owner to the largest distributor and dealer has been adopted by the Johns-Manville Company. Payments will be spread over periods ranging from six months to two years.

Under this plan a home owner can make extensive additions and repairs and receive financing accommodations from Johns-Manville on the company's materials and on the entire contract. The company looks after collections, and the legal details of the deferred-payment selling operations will be handled by its own legal department.

Power Measures Production

INDUSTRY'S pulse beats through the electric meter, for electricity has become the lifeblood of industry. Energy consumption accurately measures industrial activity. In some manufacturing lines this can be more readily proved than in others; it is necessary to have not only comparable figures on energy consumption, but other and parallel measures of manufacturing activity. Output is one, consumption of raw material is another.

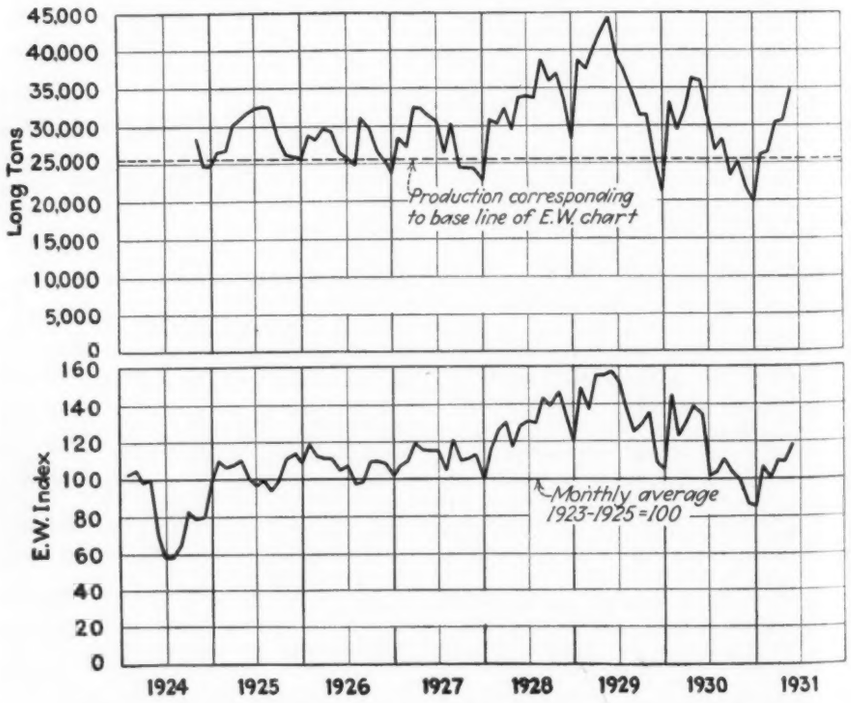
In the rubber industry an excellent series of data for the latter exists in the reports of the Rubber Manufacturers' Association. For energy statistics the ELECTRICAL WORLD has published comparable data by months running back to 1923. These have been given in the form of index numbers, showing the energy consumption in numerous representative plants in various parts of the United States and in different branches of the rubber industry, referred to a base month. For the latter the average of 1923-1925 has been taken. It does not, therefore, profess to be an electrical census of the entire industry; rather, an effort has been made to give figures, month by month, that shall correspond and thus register the fluctuations in per cent.

Both sets of statistics are here shown in chart form. For reference a base line has been computed for the consumption curve corresponding to 100 on the index chart. Production figures for the base period, 1923-1925, not being available, they were derived by averaging the monthly production for the years represented, averaging the index numbers for the same period, and finding the production equivalent to index 100.

The close resemblance of the two curves shows that either series may be taken as an indicator of activity in the rubber industry. Both show definitely the rise beginning in 1928 to a peak in May, 1929, then an irregular decrease in December, 1930, interrupted by peaks in January and April. They differ chiefly in that the fluctuations from month to month in the rubber consumption curve are sharper than in the ELECTRICAL WORLD index.

For the electrical industry the chief interest in the present comparison for rubber manufacture and in a similar comparison for automobile production appearing in the ELECTRICAL WORLD, February 14, 1931, lies outside of those particular industries. It lies in the evidence thus afforded that electrical consumption is presumably an accurate gage also for industries in which the operation in terms of production units is not readily available, and in the further proof, if any were needed, that power sales are instantly responsive to the demands of industry, and that the electrical facilities must be kept constantly in readiness to meet that demand.

Measures of activity in the rubber industry



Electrical World Industry Index and U. S. Monthly Rubber Consumption

CURRENT EARNINGS REPORTS OF ELECTRIC LIGHT AND POWER COMPANIES

Operating Companies

	1931	1930	Per Cent Increase	Operating Ratio 1931	Operating Ratio 1930
Alabama Power (Year ended June 30)					
Gross earnings	$17,982,600	$18,047,043	— 0.4	42	42
Net earnings	10,472,911	10,571,293	— 0.9	..	..
Consumers Power (Year ended June 30)					
Gross earnings	31,671,822	33,259,183	— 4.8	43	47
Net earnings	18,035,298	17,369,474	3.8	..	..
Eastern Texas Electric (Year ended June 30)					
Gross earnings	9,877,967	10,104,259	— 2.2	62	58
Net earnings	3,763,275	4,210,225	—10.4	..	..
Georgia Power* (Year ended June 30)					
Gross earnings	25,799,646	26,490,916	— 2.6	50	47
Net earnings	12,844,802	13,973,129	— 8.1	..	..
Gulf States Utilities (Year ended June 30)					
Gross earnings	6,843,072	7,012,905	— 2.4	59	55
Net earnings	2,802,095	3,166,316	—11.5	..	..
Kansas City Power & Light (Year ended June 30)					
Gross earnings	14,839,648	14,690,312	1.2	46	50
Net earnings	7,956,018	7,386,809	7.7	..	..
Louisville Gas & Electric (Year ended June 30)					
Gross earnings	10,834,510	10,391,661	4.3	..	..
Net earnings	5,752,031	5,401,556	6.5	..	..
Northern States Power (Year ended June 30)					
Gross earnings	33,690,458	33,084,470	1.8	..	..
Net earnings	16,925,349	16,846,365	0.5	..	..
Ohio Edison (Year ended June 30)					
Gross earnings	18,885,032	19,416,472	— 2.7	39	42
Net earnings	11,617,930	11,303,803	2.8	..	..
Oklahoma Gas & Electric (Year ended June 30)					
Gross earnings	13,063,747	14,676,253	—11.0	..	..
Net earnings	6,048,671	6,867,985	—11.9	..	..
Puget Sound Power & Light† (Year ended June 30)					
Gross earnings	16,524,491	16,926,533	— 2.4	55	56
Net earnings	7,170,072	7,186,895	— 0.2	..	..
San Diego Consolidated Gas & Electric (Year ended June 30)					
Gross earnings	7,369,853	7,241,734	1.8	..	..
Net earnings	3,759,359	3,467,610	8.4	..	..
Tennessee Electric Power (Year ended June 30)					
Gross earnings	14,023,217	15,325,612	— 8.5	52	51
Net earnings	6,691,893	7,538,659	—11.2	..	..

Holding Companies

	1931	1930	Per Cent Increase	Operating Ratio 1931	Operating Ratio 1930
American Commonwealths Power & affil. cos.‡ (Year ended June 30)					
Gross earnings	$27,051,230	$27,326,576	— 1.0	49	54
Net earnings	13,849,250	12,608,864	9.8	..	..
American Light & Traction & subs.† (Year ended June 30)					
Gross earnings	42,256,261	46,832,292	— 9.8	72	71
Net earnings	11,651,884	13,362,789	—12.8	..	..
American Water Works & Electric & subs. (Year ended June 30)					
Gross earnings	52,252,703	55,060,661	— 5.1	52	50
Net earnings	25,200,831	27,391,986	—8.0	..	..
Commonwealth & Southern (Year ended June 30)					
Gross earnings	135,451,420	146,906,246	— 7.9	48	49
Net earnings	70,840,613	75,050,793	— 5.6	..	..
Eastern Utilities Associates & constituent cos. (Year ended June 30)					
Gross earnings	9,212,395	9,383,840	— 1.8	58	59
Net earnings	3,850,466	3,804,217	1.2	..	..
Engineers Public Service & subs. (Year ended June 30)					
Gross earnings	52,743,091	52,109,228	1.2	..	..
Net earnings	22,475,714	22,262,755	0.9	..	..
Federal Light & Traction & subs. (Year ended June 30)					
Gross earnings	8,316,247	8,471,197	— 1.8	55	55
Net earnings	3,761,440	3,824,484	— 1.6	..	..
North American & subs.‖ (Year ended June 30)					
Gross earnings	121,827,955	147,278,311	—17.3	53	52
Net earnings	56,958,934	71,515,071	—20.2	..	..
Philadelphia Company (Year ended June 30)					
Gross earnings	59,438,575	63,225,026	— 5.9	..	..
Net earnings	29,812,079	31,063,183	— 4.2	..	..
Standard Gas & Electric & subs. (Year ended June 30)					
Gross earnings	150,613,044	155,537,442	— 3.2	..	..
Net earnings	73,009,108	75,022,681	— 2.7	..	..
United G.Improvement & subs. (Year ended June 30)					
Gross earnings	106,975,086	107,857,285	— 0.8	58	59
Net earnings	45,805,611	44,204,660	3.6	..	..

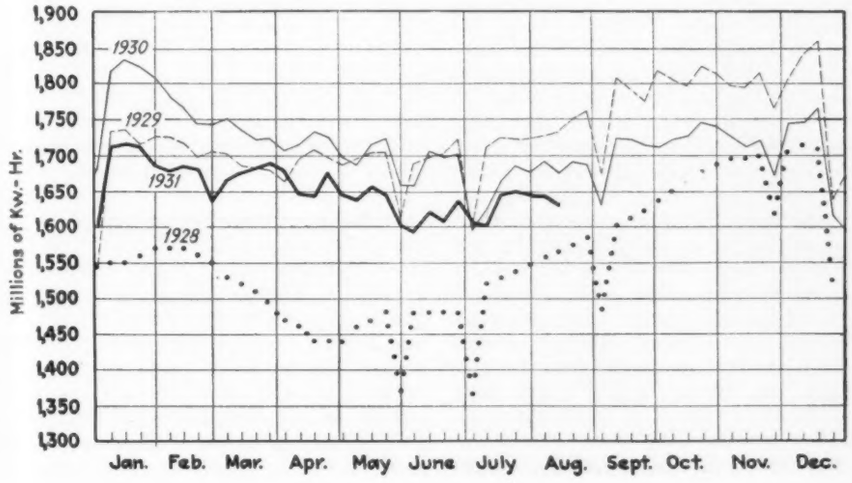
* Columbus Electric & Power included. † Operating expenses include depreciation. ‡ Exclusive of Vermont Lighting Co. and St. Johnsbury Gas Co. ‖ Excludes former California subsidiaries for 12 months ended June 30, 1931, and 18 days ended June 30, 1930.

Weekly Energy Output

COMPARED WITH THE corresponding week last year, central-station energy output during the week ended August 22 decreased 2.8 per cent. Estimated output during the recent weeks, with equivalent figures for earlier years, as announced by the statistical research department of the National Electric Light Association, was as follows:

	1931	1930	1929	1928
July 25	1,651	1,686	1,723	1,539
August 1	1,644	1,678	1,725	1,549
August 8	1,643	1,692	1,730	1,558
August 15	1,629	1,677	1,733	1,567
August 22	1,643	1,691	1,750	1,576

The table gives revised figures for July and the chart has been redrawn to incorporate those and other revisions as explained in the ELECTRICAL WORLD of August 15.



NEWS BRIEFS

Engineers' Public Service Company has declared a dividend of 40 cents on common stock, compared with 50 cents paid three months ago.

•

New Brunswick Power Company has declared a dividend of $1 on the first preferred stock on account of accumulations.

•

Holders of first mortgage gold bonds, 6 per cent series of 1949, 5½ per cent series of 1949, 5 per cent series of 1949 and 5 per cent series of 1959 of the Eastern New Jersey Power Company, aggregating $10,300,000, have been notified that the company will call these issues for redemption on January 1, 1932, at 105 and interest.

•

From the proceeds of the recent bond financing made by the Jersey Central Power & Light Company, consisting of first mortage 4½ per cent series C bonds, amounting to $32,000,000, the company has arranged for the redemption of a substantial part of its former funded debt, bearing larger rates of interest.

Business News and Markets

Only Hubbard Shovel Companies to Merge

NEGOTIATIONS HAVE BEEN under way for some months to form a merger of several shovel-manufacturing companies. Hubbard & Company own two shovel plants—Beall Brothers of Alton, Ill., and the Jackson Shovel Company of Montpelier, Ind. If the contemplated merger is completed, it will take in these two plants only of Hubbard & Company. Neither the corporate form of Hubbard & Company nor the operation of its three principal plants, manufacturing pole-line hardware, tools and electrical construction specialties, will be in any way affected.

▼

American Brown Boveri Reports Loss for Quarter

THE REPORT OF THE American Brown Boveri Electric Corporation and subsidiaries for the first quarter of 1931 shows a net loss of $127,392 after interest, depreciation and other charges. Consolidated statement of the corporation and subsidiaries for the quarter ended March 31 this year and last is given in the accompanying table.

	1931	1930
Net profit from operation	$52,448	$111,041
Income from investment, etc.	24,639	9,490
Miscellaneous income	21,008	27,009
Gross income	$98,095	$147,540
Cash discount on sales	89	129
Interest on bonds	56,708	59,342
Depreciation	166,660	157,830
Miscellanous charges	2,030	16,963
Net loss	$127,392	$86,724

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Swope Will Address N.E.M.A. Annual Meeting

THE ANNUAL MEETING of the National Electrical Manufacturers' Association will be held beginning Wednesday, September 16, at the N.E.M.A. headquarters and the Hotel Commodore in New York. In addition to the section meetings, the annual dinner will be held on Wednesday evening, a meeting of the board of governors on Friday morning, and a meeting of the Policies Division on Friday afternoon at which all members of the association will be welcome. This being the annual meeting, all sections will elect officers, and after such elections the section council will select nine of its number as members of the board of governors for a term of one year.

The International Association of Electrical Inspectors is holding a meeting at Pittsburgh beginning Monday, September 14, and to avoid conflict the N.E.M.A. meeting was set for the sixteenth. Arrangements have been completed with the I.A.E.I. so that all matters of interest to the manufacturers will be presented for consideration on Monday and Tuesday, permitting N.E.M.A. members to leave Pittsburgh on Tuesday evening and arrive in New York in time for the opening of the N.E.M.A. sessions.

A prominent feature will be an address by Gerard Swope, who will picture certain conditions of fundamental importance which the industry is and will be facing and give his suggestions as to the manner in which they may be met. His address will be the only one presented and opportunity for discussion will be afforded.

Middle West Capacity Is Up 25 per Cent

CONSTRUCTION PROJECTS finished or in progress during the past twelve months will result in a 25 per cent increase in the generating capacity of the Middle West Utilities System. Capacity upon completion of present projects will total 1,617,827 kw. New generating stations are nearing completion at Sheboygan, Wis.; Dodge City, Kan., and North Platte, Neb.

▼

Vacuum Cleaner Sales

VACUUM CLEANER SALES for the first six months of 1931 are shown in the following tables, according to figures compiled by the Vacuum Cleaner Manufacturers' Association:

January	55,362	April	79,527
February	71,551	May	76,303
March	82,279	June	43,011

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Favors Court Decisions on Trade Practice Codes

MUCH sentiment in favor of legislation that would provide an appeal to the courts is developing among industries whose trade practice codes have been emasculated by the Federal Trade Commission. As it stands now the commission is the final arbiter on whether the practice condemned by an industry is an unfair method of competition.

As trade practice rules are the product of an industry's own desire to improve its business conduct, it is argued that the commission should not have absolute authority to take the shaping of a code out of the industry's hands.

The bill of Senator Nye, it is felt, may serve as the springboard for opening consideration in the next session of Congress of the whole controversy revolving around the commission's policy in the handling of codes during the past year. In the form introduced the Nye bill merely would remove the doubt that still attaches to assumption by the commission that statutory authority extends to the trade conference practice procedure established several years after the Federal Trade Commission was created in 1914.

For the purpose of restoring the trade practice code movement to full vigor the Nye bill would be amended to provide a means by which industry, through the courts, may gradually extend the scope of what now constitute unfair methods of competition in law. The bill as amended would give the members of an industry the right to carry into effect a rule rejected by the commission as violating the anti-trust laws, with the understanding that upon receipt of notice to this effect the commission shall issue a complaint that in due course would carry the issue to the courts for determination.

This proposal for legislation to support trade practice codes does not imply any modification of the anti-trust laws. Under the Nye bill as amended the test of the validity of such trade agreements would be whether they violated such laws. All rules would thereafter be group I rules, thus eliminating that doubtful category, known as group II, which the commission has received as "expressions of the trade" concerning practices that an industry regards as uneconomic but which the commission is reluctant to characterize as constituting unfair methods of competition.

Poles Treated in 1930

FOLLOWING IS a statement of the number of poles treated in the United States in 1930 as published by the U. S. Department of Agriculture in co-operation with the American Wood Preservers' Association:

Kind of Wood	Full-length Pressure Treatment	Butt Treatment Only	Total
Southern pine	2,428,001	*172	2,428,173
Cedar			
Western red	11,073	1,114,422	1,125,495
Northern white	28	425,026	425,054
Chestnut	.....	188,958	188,958
Lodgepole pine	8,983	87,374	96,357
Douglas fir	10,719	1,209	11,928
Miscellaneous	.....	66	66
Total	2,458,804	1,817,227	4,276,031

* Experimental treatment.

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New York Metal Prices

	Aug. 19, 1931 Cents per Pound	Aug. 26, 1931 Cents per Pound
Copper, electrolytic	7⅛	7⅛
Lead, Am. S. & R. price	4.40	4.40
Antimony	6.55@6.60	6.55
Nickel, ingot	35	35
Zinc, spot	4.15	4.15
Tin, Straits	25.60	27.00
Aluminum, 99 per cent.	23.30	23.30

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TRADE BRIEFS

Lucian C. Brown Company, Inc., in addition to its present material-handling equipment has taken on the following accounts: International Forests Products, Inc., Westinghouse Electric & Manufacturing Company, porcelain insulators, Railway Materials Corporation. W. J. Stanton, for many years associated with the General Electric Company and the Ohio Brass Company, has been elected vice-president of the Lucian C. Brown Company, Inc.

•

Condenser Corporation of America announces the appointment of the Industrial Products Sales Corporation to represent it in the St. Louis territory on power-factor-corrective equipment.

•

Acme Wire Company announces the appointment of E. B. Henderson Company as exclusive distributor to the manufacturers in St. Louis, for magnet wire, coils, varnished insulators and condensers.

•

Reliance Manufacturing Company and subsidiaries report for quarter ended June 30, 1931, net profit of $183,215 after charges, taxes, etc. This compares with $141,265 in preceding quarter and $44,948 in June quarter of the previous year.

•

Ohio Brass Company announces that its Cleveland office is now located at 540 Terminal Tower.

American Transformer Company, Newark, N. J., has announced the opening of its own sales office at 50 Church Street, New York.

•

Dividends paid by manufacturers of electrical equipment in July amounted to $4,968,348, according to the Standard Statistics Company of New York. Total cash dividend payments made by domestic corporations in July were $516,095,367.

Fusion Welding Corporation, Chicago, has appointed the Puritan Compressed Gas Corporation of Kansas City as distributor for the "Weldite" line of welding rods.

•

Cutler-Hammer, Inc., reports for six months ended June 30, 1931, net loss of $270,086 after charges and taxes. This compares with net profit of $802,807, equivalent to $2.43 a share on the capital stock in first half of 1930.

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Little Change in Electrical Manufacturing

ACTIVITY in electrical manufacturing establishments remained at virtually the same level in July as in the preceding two months, according to returns of electrical energy consumption received by the ELECTRICAL WORLD. The July level was, in fact, also very close to the average for the five-month period begun in March. Adjusted for 26 working days, so as to eliminate the effect of differences in the length of the working month, comparative index numbers are shown in the accompanying table:

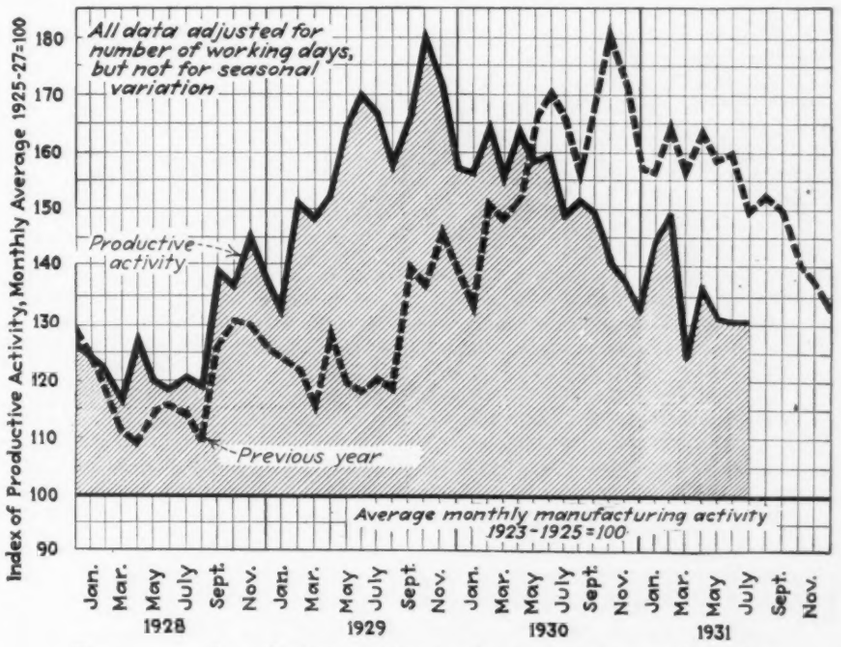
Comparative Index Numbers

	1931	1930
July	130.1	148.5
June	130.8	160.2
May	132.0	158.0
April	136.7	164.9
March	124.3	153.0
February	149.0	165.2
January	144.7	156.2
Average, seven months	135.4	158.0

Compared with 1930, the July index is down about 12 per cent, the seven-month average 14 per cent. Although the showing is poor compared with the past two years, the level even now is 8 per cent higher than in 1928 and above the level of July in any earlier year.

A feature of the returns which may prove significant is the gain in the Midwestern industrial area. These reports now show an upward trend. In general the activity is greater than during last November, for example, when by contrast the national index was higher than it is at present. It is too early to say whether or not this marks the beginning of a definite rise. Gains are indicated also in New England, but in the Middle Atlantic States the majority of the reports show less active operations than early last winter.

While detailed analysis by type of product is not feasible, there are indications that the productive activity represented by the present index involves less than the usual proportion of heavy machinery and correspondingly more of other kinds of electrical goods.



Barometer of productive activity in the electrical manufacturing plants of the United States

Market Conditions

LARGER Eastern manufacturers anticipate some of the best buying of the year during the last four months, and there is a distinct improvement in tone. Producers of apparatus for radio service are showing higher schedules than at any time since January. The dullness of business in equipment elsewhere has been intensified during the vacation period in most sections of the country. Here and there inquiries indicate rising volume in September, but signs of any definite improvement are still intangible. Sentiment is better in the Middle West

——PACIFIC COAST AND SOUTHWESTERN business continues on a dead level with small orders accumulating in the latter area.

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EASTERN

—AUGUST CLOSES *with a quiet week in the electrical equipment market in the Eastern district, with vacations and usual summer dullness showing their effects on impending purchases. A survey of the local trade brings out forcibly that the larger manufacturers of electrical equipment find considerable improvement in the situation and look forward to some of the best buying of the year in the concluding four months of 1931. Smaller manufacturing interests, in general, are not very optimistic regarding the outlook and express a variety of views.*

—IT IS INTERESTING *to note that producers of electrical apparatus for radio service are showing higher manufacturing schedules than at any time since January and anticipate continuance of the upward buying movement.*

A central station in Westchester County has placed an order with a New York manufacturer for transformers and accessory equipment to an amount of $30,000. Anaconda Wire & Cable Company has secured an important contract for wire and cable for wiring service in the new Radio City project in New York, totaling over 2,000,000 lb. of insulated and other material; the total installation will approximate 14,750 miles. Simplex Wire & Cable Company has tendered a low bid for 40,000 ft. of submarine cable for the United States Coast Guard and is expected to secure award. The same company is also low bidder for 35,000 ft. of similar cable for the same government department. Five bidders have entered quotations for Diesel marine oil engines for the Coast Guard, with complete accessories. The order, it is thought, will soon be placed.

Specialty account for radio and other domestic service is developing improved sales to a notable extent. The National Battery Company has secured commitments from two leading distributors totaling over $20,000,000 for battery units for the next four-year and five-year periods respectively. Sales in August exceeded those of the same month of a year ago by 10 per cent. and production schedules are being advanced. A manufacturer of radio sets reports a volume of orders for over $10,000,000 for merchandise to be delivered early in the fall.

Practically all leading electric refrigerator manufacturers are securing increased sales. General Electric Company shows an advance of 26 per cent in orders for the first six months of 1931, as compared with the same period last year. Manufacturers in the Middle West show orders in July more than 150 per cent over those for the same month in 1930, with shipments in that month exceeding those of July, 1930, by more than 80 per cent.

CONSTRUCTION PROJECTS

American Can Company, New York, contemplates an addition to branch plant at St. Paul, Minn., to cost over $300,000. Dietel & Wade, Buffalo, architects, have plans for a new multi-story city hospital to cost $1,250,000. Department of Correction, Albany, plans power plant at proposed state prison at Wallkill, N. Y., entire project to cost $1,450,000. Tri-State Oil & Gas Corporation, Elmira, N. Y., now changing name to Tri-State Gas & Electric Corporation, plans extensions in power lines and system to cost over $1,000,000. Orange, N. J., is asking bids until September 1 for extensions and improvements in electric light and power plant and pumping station, to cost $435,000. Freedom Oil Works Company, Freedom, Pa., plans extensions and improvements in plant to cost about $200,000. Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until September 1 for fourteen motor-generator sets (Schedule 6388). Bureau of Yards and Docks, Navy Department, Washington, will receive bids (no closing date stated) for an electrically operated refrigerating plant for naval operating base at Pearl Harbor, T. H. (Specification 6572).

NEW ENGLAND

—EQUIPMENT FOR NEW CONSTRUCTION *features the demand in the electrical market. Institutions are interested in small turbo-generators, and a number ranging from 200-kw. to 400-kw. capacity are being considered by engineers. Recently two three-phase 2,000-kva. transformers were purchased for use in a large construction project, as well as interesting control apparatus.*

Small-motor sales noted are in small lots, though single motor sales for 50-hp. units and up are recorded. Additional horsepower in small factories in northern New England shows an encouraging trend in industrial advance in that territory and amounts to about 400 hp. Central-station supplies are quiet, but new construction materials are gaining in sales volume and wiring contracts are of interest, one recently closed amounting to about $40,000 for sound and picture projection purposes. Street-traffic signals costing over $4,000 were recently purchased for use in a Massachusetts city. Appropriation for new construction in New England announced by the New England Telephone & Telegraph Company amounted to about $1,750,000.

CONSTRUCTION PROJECTS

State Department of Education, Boston, has plans under way for a new nautical training school at Charles River Basin, to cost about $1,000,000. Revere Sugar Refining Company, Charlestown, Mass., has filed plans for an addition to cost close to $65,000. Arthur Rosenstein, Boston, architect, has plans for a multi-story automobile service, repair and garage building to cost more than $165,000.

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SOUTHWEST

—IN THE ST. LOUIS DISTRICT *the steady volume of small orders has been maintained. No very large business is in prospect, but several fair-sized orders are being figured.*

A contract was closed during the past week for two turbo-generator units, 500 kw. each, for driving centrifugal pumps in municipal pumping plant, with condensers and switchboard, valued at $110,000. The estimated cost of this plant, including buildings, steam generators and all accessories, is $1,700,000. Another contract covers equipment for a substation in the Merchandise Mart, St. Louis, including transformers, oil switches, arresters and busbars, at a cast of $14,000.

CONSTRUCTION PROJECTS

American Airways, Inc., Chicago, will take bids for a hangar and shop unit at Lambert airfield, St. Louis, to cost about $100,000. Laclede Power & Light Company, St. Louis, contemplates an addi-

tion to power plant on Mound Street, with installation of 5,000-kw. generating unit and accessory equipment. Arkansas Compress Company, Corpus Christi, Tex., plans addition to cotton-compress plant to cost about $100,000. Constructing Quartermaster, Barksdale Field, Shreveport, La., plans early call for bids for five new mechanical buildings at local air field to cost about $190,000.

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PACIFIC COAST

—ELECTRICAL BUSINESS *continues at the same dead level, composed of hand-to-mouth buying for construction needs and miscellaneous spares for plant maintenance without regard to various seasonal urges of normal years.*

—SOME OPTIMISM PREVAILS *for September, when various large construction projects will make themselves felt in actual ordering or estimating, and it is justified by such industrial rumors as a $1,500,000 glass plant for Alameda and a $500,000 paper warehouse for Los Angeles, besides actual orders such as $3,500 worth of Westinghouse motors for oil-burning equipment in the Bay area.*

Irrigation districts such as Modesto, which has ordered a carload each of wire and poles, are buying somewhat actively, but the hope that San Joaquin Valley would be benefited by a reported Sacramento Valley water surplus has been indefinitely deferred. Power-company purchasing includes $2,000 worth of meters and several carloads of poles for the Hawaiian Islands, $20,000 worth of spare General Electric turbine parts for two San Francisco stations, $3,000 worth of disconnecting switches for Burbank, a carload of poles for Redding and substation equipment for the Ukiah district. The $700,000 allotted for flood control in the Los Angeles area includes an appropriation for strategic telephone lines. Orders to be placed include material for a $40,000 electrical contract for Beverly Hills City Hall, $10,000 worth of fixtures for Oahu Naval Munition Depot and special material for the Legion building and opera house in San Francisco. Electrical sales so far this year have declined about 30 per cent in southern California over last year, 23 per cent in the Bay district, 35 per cent in Portland and 25 per cent in the Seattle area.

No improvement in sales is noted over the past few weeks in the Northwestern territory, and indications for fall business are not considered propitious. Motor sales are showing a constant decrease and apparatus movement is extremely light. Sales reported include one 15-kv. outdoor-type circuit breaker to a central station in the Puget Sound district and $1,000 worth of miscellaneious switch gear; 30 transformers, from 15-kva. down, to a local power company; an order for 216 other motors, from 100-hp. down, to mines and lumber mills; 40 machines, from 100 hp. down, the majority under 20 hp., to miscellaneous industrials; 25 motors, from 50 hp. down, to small industrials and pulp and paper plants, and about ten motors and pumps for irrigation. Specifications are being written for five 500-kw. rectifiers, costing between $90,000 and $100,000, for the city of Tacoma's street railway system, and bids, it is stated, will be invited soon. Immediate development of a $1,000,000 pulp and paper mill at Priest River, Idaho, is promised by the Pacific States Pulp & Paper Company, the project involving a 100-ton "Kraft" pulp mill at Priest River, a 100-ton silica plant at Brewster, Wash., and a power plant at Priest River. Specifications are being written for lighting system on the $3,500,000 Aurora Avenue bridge in Seattle, involving 126 poles and torch-type lanterns.

CONSTRUCTION PROJECTS

Long Beach Market Company, Long Beach, Calif., plans shop and market building to cost about $400,000. Western Pacific Railroad Company, San Francisco, plans engine house and shops at Keddie, Calif., to cost about $50,000. City Purchasing Agent, Los Angeles, will receive bids until September 15 for electric and hydraulic equipment for Department of Water and Power. Puget Sound Power & Light Company, Seattle, plans extensions and improvements in power substation at Everett, Wash., to cost close to $150,000. Giant Powder Company, San Francisco, contemplates plant in vicinity of Nisqually, Wash., to cost over $1,000,000. Bureau of Reclamation, Denver, will receive bids until September 1 for gates, gate hoists, gate stems, etc. (Specification 533-D).

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MIDDLE WEST

—SOME SLIGHT IMPROVEMENT *in general business is observed this week in the Middle West section. While the volume of business does not reflect any decided change, encouraging reports are being received from various sections indicating a resumption of activities.*

The major industries are in a slightly improved position, and the decidedly pessimistic attitude noticeable at the beginning of the month is being replaced by a mildly optimistic one as the month draws to a close. One of the bright spots in a rather dull picture is the excellent showing being made by several of the railroads, which report increases in the number of revenue cars handled and the resumption of maintenance of purchasing on a larger scale. Wholesale trade is feeling an active demand for fall merchandise, although retail trade is still suffering from the effects of distress selling. The various utility companies are quietly marking time and proceeding with their construction programs as rapidly as possible. A considerable amount of equipment and apparatus is on inquiry, and orders should be placed within a short time.

CONSTRUCTION PROJECTS

District Engineer, United States Army, St. Paul, Minn., plans call for bids in fall for construction of lock and dam across Mississippi River, near Alma, Wis., with electrically operated machinery, to cost $3,500,000. Edwards & Brethren Steel Corporation, Wyandotte, Mich., plans plant addition to cost over $150,000. Park Commission, Chicago, plans four field buildings to cost close to $1,000,000. Eaton, Ohio, has plans under way for a light and power plant with 500-kw. generator Diesel engine, condenser, switchboard and other equipment. State Teachers' College, Minot, N. D., will receive bids until September 8 for switchboard, stokers, pumping machinery, boilers and other power equipment. Bellevue, Iowa, will receive bids until September 10 for addition to electric light and power plant.

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SOUTHEAST

—LITTLE CHANGE IS TO BE NOTED *in general conditions in the Southeast. Electrical business is spotty and the volume only reasonably satisfactory. The largest equipment order reported last week was placed by the city of Atlanta for ash-handling equipment for the city water-pumping stations, amounting to approximately $17,000.*

There were ordered last week for a Georgia central-station disconnecting switches aggregating $8,300 and oil circuit breakers amounting to $7,150. One company's transformer orders in the past ten days aggregated $6,820. Some other power-company orders were for $6,900 worth of insulators and pins and $2,700 worth of creosoted pine poles. There is in prospect for this week an order for transformers totaling about $7,000 for a Georgia company, while a west coast of Florida company contemplates the purchase of substation equipment totaling in excess of $150,000.

CONSTRUCTION PROJECTS

Kentucky Electric Development Company, Louisville, Ky., contemplates hydro-electric power plant on Chaplin River, near Bardstown, Ky., to cost over $350,000. Coastal Petroleum Company, Mobile, Ala., contemplates oil-refining plant to cost about $200,000. Dixie Glass Bottle Manufacturing Company, Jackson, Miss., has approved plans for plant to cost $100,000. Swift Manufacturing Company, Columbus, Ga., has authorized an addition to cotton mill to cost over $100,000.

New Equipment Available

Ratio Meter as Combustion Guide

A RATIO METER for use as a combustion guide in the firing of gas- or oil-fired heaters, kilns and all types of industrial furnaces has been announced by the Bailey Meter Company, Cleveland, Ohio. The purpose of this meter is to provide furnace operators with an easily understandable guide which will

enable them to maintain a definite relation between the amounts of air and fuel supplied to the furnace so as to obtain high combustion efficiency.

The Bailey ratio meter has been so designed that it is possible to install auxiliary recorders of temperature or pressure when advantageous, to give records of these factors on the same chart with the flow records. This feature makes comparison of related factors a simple task, especially since the 12-in. diameter charts are uniformly graduated and are marked with direct reading scales. Each factor is recorded in an individual color so that it can be easily distinguished from other records.

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Portable Tool for Splicing Metal

THE TEMPLE VELOCITY PRESS is a portable tool for splicing or bonding aluminum, copper and steel cable. It has been placed on the market by Temple Velocity Equipment, Inc., New York. It may be used for underground or overhead installations and is adaptable for small manholes and other confined spaces. The ends of the cable are inserted in a sleeve, or other suitable connection or terminal, and compressed between two dies with energy derived from a small cartridge of a commercial grade of powder. This compresses the material of the joint and cable into a solid mass, permitting a perfect electrical conduction.

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Code Selector Supervisory System

A NEW TYPE OF CODE selector supervisory system for the remote control of various types of switchgear located at distant stations has been announced by the General Electric Company. With the use of only two wires of telephone size a supervised unit can be checked and operated from the dispatcher's office in less than five seconds. Automatic operation is also transmitted and indicated at the dispatcher's office within five seconds.

The position of the supervised units is indicated by lamps on the control panel in the dispatcher's office. The wire used for supervision may also be used for telephoning, telemetering electrical quantities, water level, gate position, pressure, etc.

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Hand-Operated Crane for Power Houses

A HAND-OPERATED CRANE, designed for use in pipe-line compression stations and power houses, but which is adaptable to a wide range of other industrial applications, has been announced by the Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio. Occupying approximately 40 per cent less headroom than the standard equipment, it will give higher lift in existing buildings or permit a reduction in building height in buildings under construction, it is claimed.

This crane is equipped with Hyatt bearings throughout with the exception of the load hook, which is supported on a Timken roller thrust bearing. The entire construction is welded steel. All gears and pinions are cut from solid alloy steel forgings. Trolley wheels and chain sheaves are of "Aremite," a new light-weight alloy metal having twice the tensile strength of gray iron. A two-speed hand wheel provides for double speed at half full load.

Front-Operated Switch Suitable for Ganging

A NEW FRONT-OPERATED safety switch designated "RB," of identical design with the side-operated type, but for which, in addition, the following advantages are claimed, has been announced by the Trumbull Electric Manufacturing Company, Plainville, Conn. It is convenient for close ganging and for mounting on industrial switchboards where space requirements are limited. The lower half of the cover is hinged at the center and interlocked with switch handle. The slot in the end of the handle provides for "stick operation" when the switch is installed out of reach, and the handle lies close to the cover in both "on" and "off" position. The handle guard is equipped with slots for use in locking the switch in either the "on" or "off" position. The cover is readily removed for switch inspection by taking out four screws.

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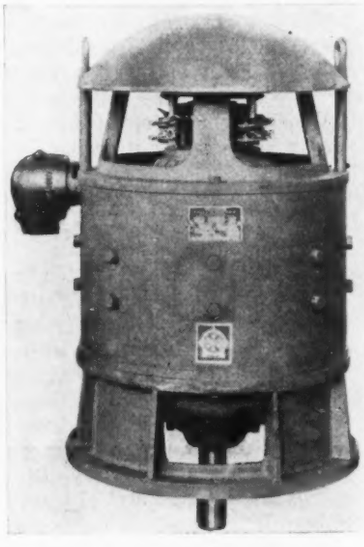
Direct-Current Vertical Motors

DIRECT-CURRENT MOTORS, designated as type T, for vertical operation in sizes up to 50 hp., 1,150 r.p.m., have been developed by the Reliance Electric & Engineering Company, Cleveland, Ohio. These motors are provided with a ring base for mounting and a drip cover to protect them from falling dirt and chips and from dripping water, oil or other injurious solutions.



Where it is desirable the motor can be mounted direct to the machine being driven without the ring base and appear as an integral part of the machine. Amply large bearings are used to take up the thrust load or weight of the armature. Two heavy eye-bolts are provided to make handling easy.